# *Water Resources of the Occupied Palestinian Territory*

UNITED NATIONS

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# *Water Resources of the Occupied Palestinian Territory*

Prepared for,
and under the guidance of,
the Committee on the Exercise
of the Inalienable Rights
of the Palestinian People

United Nations • New York, 1992

NOTE

Symbols of United Nations documents are composed of capital letters combined with figures. Mention of such a symbol indicates a reference to a United Nations document.

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Note

1 dunum = 1,000 square metres

1 new Israeli shekel (NIS) = 100 agurot or, in 1986, approximately US$.68

# INTRODUCTION

*Like desert camels of thirst dying,*
*While on their backs water bearing.*
*(Arab verse after Emile Habiby)*

The present study updates a pamphlet on water resources, prepared for, and under the guidance of, the Committee on the Exercise of the Inalienable Rights of the Palestinian People, issued in 1980. As information on water resources continues to be incomplete, figures given in this study should be considered as orders of magnitude, not technical data, illustrating the infringement of Palestinian rights to their water resources.

Information on basic features of the geography, hydrology and numerous development plans for water resources related to the occupied Palestinian territory reveals three main areas which have throughout most of the twentieth century received international attention and continue to be the focus of concern in the 1980s and beyond. These are the Jordan River basin water resources involving Israel, Jordan, Lebanon, the Syrian Arab Republic and the West Bank; the groundwater resources originating in the West Bank, largely consumed in the lowlands of Israel and by the Israeli settlements; and the groundwater resources of the Gaza Strip, which partially originate in Israel and are over-exploited and polluted. Based on these broad geographical features of the Palestinian water economy, the first part of this study addresses in three sections the diversion, depletion and control by Israel of Palestinian water resources. The first section of part I details the Jordan River basin and groundwater resources involving the occupied Palestinian territory and introduces major Israeli projects diverting these water resources. The second section focuses on the effects Israeli annexation, land and settlement policies have on the Palestinian water economy in terms of the unilateral integration of the water infrastructures of Israel and the occupied Palestinian territory, the seizure by Israel of about half of the Palestinian land under occupation and the preferential treatment of Israeli settlements in the area of water supply, consumption and development. The third section outlines some of the principal legal and institutional constraints placed by Israel on the administration and management of the Palestinian water economy. The grave problems for the Palestinian agricultural sector stemming from Israeli water policies are discussed in the second part of this study, in connection with the restrictions

placed by Israel on any Palestinian development activity requiring water. That part also addresses repressive measures, such as politically motivated interruptions of water supplies of entire communities and the massive uprooting of trees, which contribute to the reduction in the use of water by Palestinians. Part III illustrates the debilitating impact of the Israeli policies presented in the preceding parts on Palestinian water consumption: the insufficient availability and quality of water. An elaboration on the lack of effective international protection of Palestinian water resources and a brief presentation of technical proposals for future regional cooperation on water security conclude this study.

The above-mentioned ancient Arabic verse may serve as an allegory introducing the plight with regard to water resources of the Palestinian people living, since 1967, under Israeli occupation. Water resources are an important material aspect of the question of Palestine and relevant to any lasting peaceful solution to the Arab-Israeli conflict. The General Assembly, in its resolution 1803 (XVII) of 14 December 1962 on permanent sovereignty over natural resources, declared the following:

> "7. Violation of the rights of peoples and nations to sovereignty over their natural wealth and resources is contrary to the spirit and principles of the Charter of the United Nations and hinders the development of international cooperation and the maintenance of peace."

The Security Council, in its resolution 465 (1980) of 1 March 1980, took into account the need to consider measures for the impartial protection of water resources in the Arab territories occupied by Israel since 1967, including Jerusalem. The Council requested the Commission established under its resolution 446 (1979) to continue to examine the situation relating to settlements in the Arab territories occupied since 1967, including Jerusalem, and to investigate the reported serious depletion of natural resources, particularly the water resources, with a view to ensuring the protection of those important natural resources of the territories under occupation.

In the region, characterized by an arid and semi-arid climate, water is increasingly considered crucial for the economic and political survival of its countries and peoples. Many areas in the Middle East suffer from an acute water shortage as a result of a complex interaction of factors such as population growth, land-use, agricultural technologies and weather

conditions. In contrast, the occupied Palestinian territory, especially the elevated areas of the West Bank, is endowed with an abundance of renewable water resources compared with most areas in the Middle East. Although the water situation in the Gaza Strip is very serious, under normal conditions the annual replenishment of water in the West Bank would be more than adequate for the present and future needs of a much larger Palestinian population.1/

Under conditions of Israeli military occupation, however, water resources of the occupied Palestinian territory are being diverted and used at an alarming rate by Israel, the occupying Power, at the expense of the Palestinian people. Severe restrictions on drilling for water, planting and irrigation and such Israeli practices as the felling of productive trees and the destruction of crops have diminished or maintained at a low level the amount of water made available to the Palestinian population. Israeli policies ensure that most of the water of the West Bank percolates underground to Israel and settlers are provided with increasing access to the water resources of the occupied Palestinian territory. As a consequence, a "man-made" water crisis has been brought about which undermines the living conditions and endangers the health situation of the Palestinian people. In areas where water resources originating in the West Bank are over-exploited in Israel as well as in most of the Gaza Strip, the imminent threat of the permanent environmental destruction of groundwater reserves, aquifers, has been reported.2/

In addition to the intensive use by Israel of Palestinian water resources, the occupying Power contributes in a number of other ways to the plight of the Palestinians related to water shortage. For instance, the continued diversion and increasing pollution of the Jordan River basin water resources, interference with rainfall above the upstream sector of the Jordan River basin, establishment of new or expansion of existing Israeli settlements with privileged access to water, seizure of land and implementation by Israel of immigration policies resulting in a tremendous demand for water in the region place additional pressures on the water resources of the occupied Palestinian territory.

Legal and institutional arrangements governing the use of water in the West Bank and Gaza Strip prior to Israel's military occupation were fundamentally altered when privately owned water resources were managed by Israel as public property. According to a 1984 report by a team of experts, contained in a United Nations document, the extensive network of

legal powers conferred by Israeli legislation on the Israeli water administration makes it possible for the administration to intervene to a great extent in water allocation and use patterns. The Israeli water authorities may restrict or prohibit individual activities connected with the utilization, distribution and conservation of water within the occupied territories.3/ Successive Israeli Ministers of Agriculture developed plans to create a legal and political basis for maintaining Israeli control of Palestinian water resources, even in the event of an Israeli withdrawal from occupied Palestinian territory.4/ Ms. Joyce Starr, a specialist on the Middle East and water security, concluded her discussion of the various interpretations of the water situation in the occupied Palestinian territory, in an article in Foreign Policy of Spring 1991, as follows:

> "The one fact that is indisputable, however, is that the Palestinians have no decision-making power in their own water future."5/

A special report on sovereignty over water resources in the West Bank and Gaza Strip, published in the Palestinian Yearbook of International Law, 1989, suggests that Israel's water policy in the occupied territories is a natural sequel to its broader designs of colonizing and ultimately annexing these territories. Water in the occupied territories, however limited, is largely the only natural resource Palestinians have. Any tampering with that wealth would necessarily frustrate their objective of establishing their own State and would render their claim to self-determination meaningless.6/

Taking into account the Israeli policies involving the diversion, depletion and threat of environmental destruction of the water reserves of the occupied Palestinian territory, Israel does not appear to fulfil its obligations under international customary, conventional and human rights law such as the Geneva Convention relative to the Protection of Civilian Persons in Time of War, of 12 August 1949, commonly referred to as the Fourth Geneva Convention, as well as numerous United Nations resolutions.7/ The report of 25 November 1980 of the Security Council Commission established under resolution 446 (1979), focusing on water resources, contains the conclusion that the changes of a geographical and demographic nature in the occupied territories, including Jerusalem, brought about by Israel, constitute a violation of the Fourth Geneva Convention and of the relevant decisions adopted by the Security Council in the matter.8/ Critics have come to regard Israeli water policies in the occupied Palestinian territory as an obstacle to peace.9/

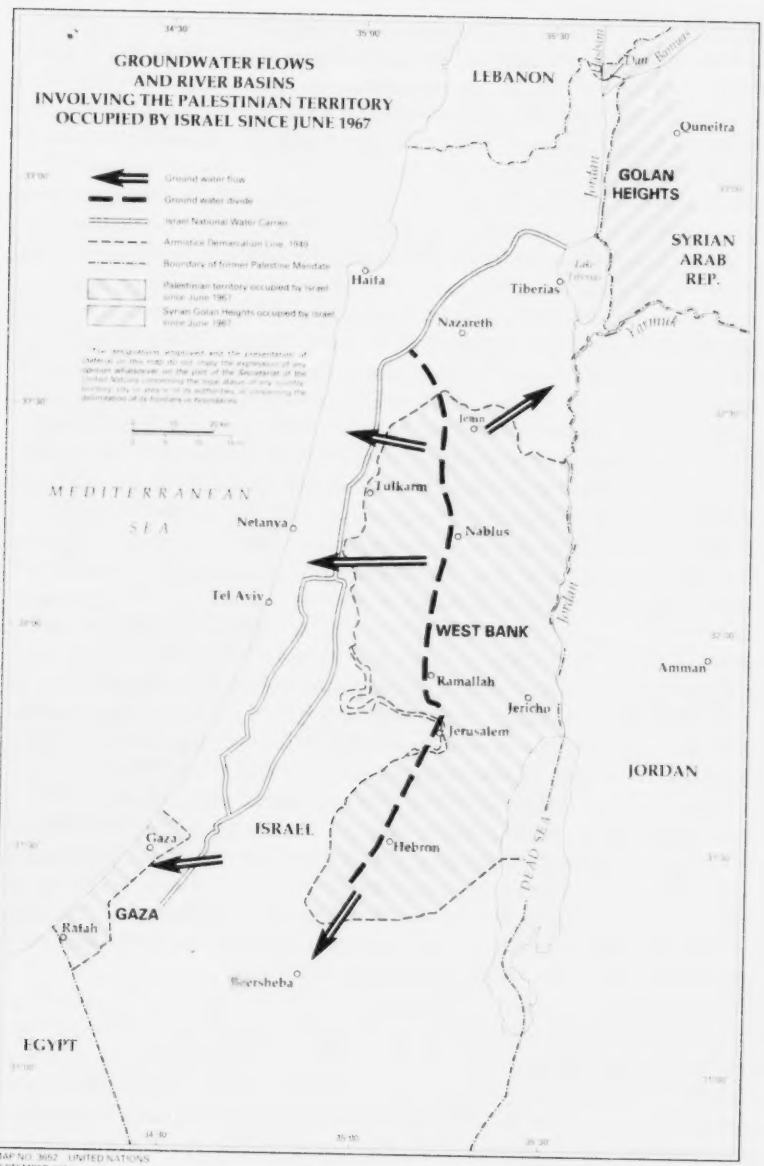
In paragraph 188 of its aforementioned report, the Security Council Commission stated that any attempt to find a comprehensive solution to the Middle East question has generally been accompanied with proposals concerning the distribution of water resources. Essentially for political reasons, these proposals were not found acceptable by some or all of the parties concerned and no peaceful solution could be found to the water problem, which has never ceased to be crucial.

## I. DIVERSION, DEPLETION AND CONTROL OF PALESTINIAN WATER RESOURCES

There are three main water resource areas pertaining to the occupied Palestinian territory that have attracted international concern. First, mostly to the north of the occupied Palestinian territory, there is the Jordan River basin. Its water resources originate in Israel, Lebanon and the Syrian Arab Republic and are being used to such an extent, in particular by Israel, that only a small, polluted amount reaches the West Bank. The Israeli diversion of these water resources, including the interference by Israel with the rainfall above the northern part of the basin, is a major concern regarding this resource area. Second, some 95 per cent of the transboundary groundwater resources originating in the West Bank are being used and over-exploited in Israel and by its settlements in the occupied Palestinian territory, leaving a meagre 5 per cent and increasingly saline water resources to the Palestinians. West Bank groundwater resources not flowing to Israel are also tapped by Israeli settlements. Third, the water crisis in the Gaza Strip, intensively cultivated and one of the most densely populated areas of the world, has reached alarming proportions: the future supply of fresh water is threatened, the quality of both drinking water and recycled water used in agriculture is rapidly deteriorating and the situation is aggravated by the additional use of water by Israeli settlements. While sea water intrusion from the Mediterranean Sea is permitted to pollute the fresh water in Gaza, Palestinians are prevented from fully contributing to control the water quality of the Mediterranean Sea and using their share of its natural resources. Israel acknowledges that it has not created public bodies for Palestinian participation in water policy formulation anywhere in the occupied Palestinian territory.10/

### A. Palestinian Jordan River basin and groundwater resources, the Israel National Water Carrier and other Israeli diversion projects

The question of the allocation and transfer of water between and within water basins is central to a better understanding of the facts relating to Palestinian water rights. A 1984 United Nations report by a team of experts found that whereas the Israeli legislation on the allocation and control of water resources is more restrictive than comparable legislation and prac-

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SEPTEMBER 1991

tices in effect before 1967 in the occupied territories, in one particular respect the reverse holds true, that is, with regard to the transfer of water from one basin to another and from one area to another within the same basin.11/ The report states that Jordanian water legislation in force in the West Bank prior to Israeli occupation specifically prohibited the transfer of water from one drainage basin or aquifer to another. Even within the same basin, water could not be transferred from one area to another without an authorization from the Jordanian Council of Ministers. Since the water resource management practices of Israel ignore administrative, political and hydrological boundaries, continues the report, the Israeli authorities are in a position to transfer water from one basin or aquifer to another, both within the West Bank and from the West Bank to other areas. Water of the Jordan basin is diverted into the Israel National Water Carrier and distributed to other Israeli basins. Water abstracted from the groundwater aquifer of the West Bank is likewise conveyed into the same National Water Carrier. These waters are sometimes transferred from the National Water Carrier back to Israeli settlements in other basins located in the Golan Heights and the West Bank. This method of "water sharing", permitted under Israeli legislation, suspends the basin-of-origin protection clauses found in the legislation in force in the West Bank prior to occupation, states the report.12/ On this topic, Israel communicated to the United Nations that no water is being transferred from an occupied territory into the occupying Power's own territory and no wells exist that abstract water in what Israel termed "Judea-Samaria" to convey it to the Israel National Water Carrier or to other users outside "Judea-Samaria".13/ A few years earlier, however, in a statement contained in a 1981 United Nations document, Israel had made reference to water being pumped from the West Bank to Israel and vice versa.14/ Also, a United Nations document of 1989 on assistance to the Palestinian people mentions that Israeli authorities have been sinking wells in the Gaza Strip to supply their own national water carrier and Newsletter No. 38 of the International Coordinating Committee for Non-Governmental Organizations on the Question of Palestine contains information that a pipeline has been built to carry water from the Gaza Strip to Naqah, east of the southern area of the Gaza Strip.15/

In addition to the Israeli depletion of groundwater resources originating in the occupied Palestinian territory, their seasonal over-pumping in Israel was referred to by Mr. Gershon Baskin, Israeli director of the Israel-Palestine Center for Research and Information, in an article published in the journal Challenge of January-March 1991. The article mentioned that in the summer of 1990, the water crisis was so severe that wells ran dry

in entire West Bank villages. In Hebron, the hardest-hit area, fresh water was being sold from private tankers and in the informal market: "The situation worsened when Mekorot, Israel's water company, increased pumping in the coastal plains to meet the demands [there] of the summer heat,"16/ stated Mr. Baskin.

Any assessment of the allocation of groundwater resources is complicated by the fact that, according to experts addressing the Sixth International Water Resources Association World Congress on Water Resources, held in Ottawa, Canada, from 29 May to 3 June 1988, the customary international law in the field of water resources is not regarded as especially advanced or consolidated.17/ This is particularly true of the general principles and rules applicable to transboundary water-bearing rock strata, aquifers, and their waters. None the less, international fluvial law has evolved significantly since it emerged well over a century ago. In recent decades, the experts continue, the needs of neighbouring States in connection with their underground waters has resulted in comparatively rapid advances in this sub-field. The International Law Association, which prepared the Helsinki Rules in 1966, embracing for the first time the groundwater dimension of "international drainage basins", has culminated its study of the matter, renewed in 1968, with the adoption in 1986 of the Seoul Rules on International Ground Waters.18/

Two basic considerations may be taken into account to determine the user rights pertaining to transboundary water resources. These are "prior apportionment", whereby existing users must be satisfied before new claims are honoured, and "equitable apportionment". According to article IV of the Helsinki Rules on the Uses of the Waters of International Rivers, "each basin state is entitled, within its territory, to a reasonable and equitable share in the beneficial uses of the waters of an international drainage basin."19/

Official Israeli statements refer to both of the above-mentioned considerations in relation to the use by Israel of water resources affecting Palestinian rights. For instance, in a statement provided to the United Nations, Israel said that under international law, the principle of equitable distribution among riparians is a well-established right. It is clear that only by regional cooperation between the States concerned can satisfactory solutions be worked out for the water problems.20/ According to information contained in the August 1991 issue of South, an economic review, a related concern in this respect is the steadily increasing use of

water in the upper Yarmuk basin which may affect downstream Jordanian, Israeli and Palestinian users.21/

Moreover, the principle of "prior" or "first-use" allocation is invoked by Israel. According to official information made available to the United Nations, Israel acknowledges and accepts the related basic principles stated in a recent United Nations report. These are that: (a) any interference by one country in the surface or groundwater flow has repercussions on the activities of other countries sharing the same basin; and (b) the effects of any activities in connection with water resources are particularly felt in downstream territories which depend on upstream water supplies. The Israeli statement continues that this recognition is in fact the major reason for limiting the pumpage in "Judea-Samaria" westward, draining groundwater basins which would almost certainly affect prior rights of users with their supplies based on springs and wells situated at the foothills of the "Judean Mountains".22/

In the aforementioned article in Challenge, Mr. Baskin argues this case as follows:

> "West Bank water flows west, from the heights to the coastal plain. Fully 50 per cent of Israel's water consumption is drawn from a single aquifer, the Yarkon-Taninim, which is fed by water underneath the West Bank. According to Israeli experts, the aquifer was being fully utilized by 1960, and consequently Israel's 'first-use' claim to the water would be accepted under international law, especially regarding water from the Yarkon River and the Emek Harod and Beit She'an valleys."23/

An annual report of the Bank of Israel indicates that 37 per cent of Israel's water supply comes from the Jordan River and Lake Tiberias, 38 per cent from two large aquifers and 25 per cent from other small aquifers below the West Bank and Israel.24/ The Yarmuk River contributes about 3 per cent to Israel's water supply, over 50 million cubic metres (million cu m).25/ Israel consumes about 1,700 million cu m per year, between 450 and 500 million cu m originating in the West Bank, and controls, according to The Future of the Arab Nation, more than 2,300 million cu m of the Arab world's water resources.26/

Even though published figures do not exactly tally, estimates of the average annual potential of fresh water resources in the occupied Palestinian territory are believed to be in the region of 850 million cu m, excluding reservoirs, recycled water and the resources of an underground lake deep below the Jordan River. According to a report of the Economic and Social Commission for Western Asia (ESCWA) contained in a 1991 United Nations document, both in Israel and the occupied Palestinian territory rainfall decreases from north to south and from west to east with averages ranging from 700 millimetres (mm) per year in the north to 60 mm per year near the Gulf of Aqaba in the south and 600 mm per year in the west to 150 mm per year near the Dead Sea. Rainfall is relatively abundant in the West Bank, ranging in an average year from 650 mm in the north to 300 mm in the south.27/ The report also states that the average annual rainwater supply in the West Bank is approximately 2,800 million cu m and the average annual rainwater supply in Israel and the occupied Palestinian and other Arab territories does not exceed 10,000 million cu m. Thus, the rainwater resources in the West Bank alone represent over 25 per cent of the area's rainwater resources. The report estimates that the West Bank's annual rainfall is distributed as follows:

"2,800 million cu m - 1,900 million cu m lost through evaporation
+ 625 million cu m to groundwater basins
+ 225 million cu m to rivers (Jordan, 'Auja)
+ 50 million cu m as runoff."28/

Slightly lower estimates by the West Bank Data Base Project, directed by Mr. Meron Benvenisti, indicate that the average natural replenishment of water resources, including surface runoff and some water from the Jordan River, is in the region of 780 million cu m. The West Bank's currently used underground water reservoirs drain basically towards three large basins. These are, to the west, the Mediterranean coastal plain, located mostly in Israel; to the north-east, the Jezreel and Bet She'an Valleys in Israel; and to the east, the Jordan Valley and Dead Sea, mostly in the occupied Palestinian territory. In addition, natural drainage of the West Bank groundwater to areas as far south in Israel as Beersheba has been reported.29/ The groundwater potential of the West Bank is approximately 600 million cu m per year, distributed as follows: annually, in the western drainage area the aquifers are recharged by approximately 335

million cu m, in the north-eastern drainage area by 140 million cu m and in the eastern drainage area by some 125 million cu m.30/ An additional 180 to 200 million cu m may be provided annually by surface runoff and from the Jordan River.31/

In the Gaza Strip, apart from rainwater, groundwater is the only natural source of water, which is partly replenished by shallow aquifers from the north-western Negev in Israel.32/ Figures on the replenishment of the water resources involving the Gaza Strip vary considerably among published sources. The 1991 ESCWA report states that annual rainfall in the Gaza Strip is estimated at approximately 300 to 400 mm, which serves to recharge the aquifers with some 70 to 80 million cu m of water per year, not including groundwater that flows into the Gaza Strip from the east.33/ Other sources suggest somewhat lower figures for the annual natural replenishment of water resources in the Gaza Strip. An official Israeli statement of 1984 indicates a yield of only 50 million cu m per year.34/ Mr. Schwarz, an Israeli expert, has provided the following account:

> "The only water resource of the Gaza Strip is groundwater, which occurs in the sand and sandstone aquifers underlying the entire area at a depth of 10-50 m below ground surface. The groundwater is replenished both by direct rainwater infiltration, particularly in the sand dunes along the coast, and by underground flows entering from the east. Rainwater replenishment is estimated at 40 million cu m per year and underground flow from the east at 10-20 million cu m per year."35/

Israel's activities in the area of "cloud seeding", interfering in the upper reaches of the Jordan River drainage basin with the rainfall of the region, have raised concern because rain may be prevented from falling on the occupied Palestinian territory and possible secondary effects of the chemicals and technology used are largely unknown.36/ Mr. Zemach Ishay, Water Commissioner of Israel, estimates that Israel has increased its annual rainfall by 10 per cent through the use of chemicals or dry ice particles to trigger reluctant clouds to produce.37/ Information contained in an article by Mr. Elisha Kally, Long Range Planning Section, Tahal Consulting Engineers, Ltd., indicates that already in the early 1970s an additional water harvest of Lake Tiberias was produced by seeding the clouds over the lake basin area with silver iodide from airplanes and from ground burners in the winter season.38/

A brochure published by Mekorot, the Israel Water Company, states that "cloud seeding" became operative in 1976, carried out by Shaham, Electrical and Mechanical Services Ltd., a subsidiary of Mekorot, and annually has increased groundwater resources around Lake Tiberias by 15 to 18 per cent.39/

The Jordan River drainage basin and the Israel National Water Carrier

According to the Israeli West Bank Data Project, less than 10 million cu m are supplied annually by the Jordan River to the West Bank,40/ or approximately 1 per cent of the River basin's 890 to 1,500 million cu m available annual water resources. This information is relevant to the diversion of Jordan River water from the occupied Palestinian territory, in particular since the 1970s. Extremely meagre amounts of fresh water reach the occupied Palestinian territory. Israel pumps into its National Water Carrier larger amounts of Jordan River water than envisaged by regional plans and its original National Water Carrier specifications, and diverts into the southern Jordan River saline streams that would otherwise pollute Lake Tiberias.41/ According to the aforementioned Bank of Israel figures, Israel would appear to consume approximately 700 million cu m per year of the Jordan River basin resources, instead of, for instance, the approximately 500 million cu m envisaged under the benchmark Johnston/Main plan. The current situation is described by Mr. John Kolars, professor of Near Eastern studies, in the following terms:

> "Lake Kinneret now serves as a holding reservoir from which water is pumped to the National Water Carrier in Israel which conveys water as far south as the Gaza Strip. Any water which flows south of Kinneret along the original course of the river is so polluted with natural salts and runoff from fields that it is for all purposes unusable. In fact, the flow of the Jordan has been so diminished that the shrinking of the Dead Sea at the river's lower end constitutes another serious problem yet to be solved."42/

An editorial note by Mr. Mitchel Levitas published in The New York Times of 29 January 1992 states that irrigation and industrial demand drains the Jordan River, leaving little more than a sewer for urban and factory waste;

the reduced flow is an ecological disaster that has already lowered the Dead Sea by more than 50 feet, endangering mineral extraction.

Mr. Ishay, Water Commissioner of Israel, stated in a recent report that the 1979 "decision to reduce the water level [of Lake Tiberias/Kinneret] was taken in order to prepare operative storage for the purpose of preventing Kinneret water from flowing to the Dead Sea, which is a waste of vast amounts of water [in the region of 40 million cu m annually]."43/ Furthermore, in a statement to the United Nations, Israel acknowledges the diversion of Jordan River basin water resources in downstream areas. The statement indicates that Israeli use of a deep water table in the Jericho area of the Jordan River is at the expense of unused outflow to the Dead Sea, not at the expense of the flow to the already over-exploited aquifers and with no influence on present users.44/ A Mekorot publication entitled "Israel National Water Carrier - 50 years of Mekorot" states that "[i]n order to increase the conveyance capacity of the National Carrier it was decided to incorporate in it five additional pumping stations not included in the original plan."45/ Work began in April 1967 and was completed in 1970. According to the Mekorot publication, "[t]he five new pumping stations increased the capacity of the National Carrier from 11 to 16 cubic meters per second, and made it possible to take in additional water into the system and deliver it to the consumers in the south of the country. Thanks to these pumping stations, the National Carrier now conveys 440 million cubic meters annually, instead of the 320 million originally planned."46/

The water resources of the drainage basin of the Jordan River and its tributaries are used by Israel, Jordan, Lebanon, the Syrian Arab Republic and the Palestinian people. The West Bank was always viewed as a recipient of water resources from any development of the Jordan and Yarmuk Rivers drainage basin.47/ An article by Mr. Ewan Anderson in Arab Affairs, a quarterly of the League of Arab States, sets out the following on the sources and development of the Jordan River basin. The three headwaters are the Hasbani, which rises in Lebanon, the Dan, wholly located in Israel, and the Baniyas, whose springs are in the Syrian Arab Republic. The confluence of these produces the Jordan which flows into Lake Tiberias, after which it is joined by its major tributary, the Yarmuk. South of this river, most inputs are seasonal, resulting from winter wadi flow. Between Lake Tiberias and the Dead Sea, the Jordan has entrenched its course, leaving terraces, the West Ghor and the East Ghor, above it. The output of all three sources varies considerably, but the Dan contributes 50 per cent of the discharge which, on reaching Lake Tiberias, is some 660 million cu

m.48/ The Economics Department of the Palestine Liberation Organization detailed the following annual quantities for the respective headwaters: Hasbani - 155 million cu m, Dan - 240 million cu m and Baniyas - 120 million cu m (other - 85 million cu m).49/ Taking into account evaporation, the article in Arab Affairs states that approximately 500 million cu m of the inflow from these three sources leave Lake Tiberias. To this, a further 500 million cu m is added from the Yarmuk River and a slightly greater quantity from wadis and springs.

A monograph issued in January 1991 by the Gulf Centre for Strategic Studies, London, addresses the distribution of the waters of the main tributary of the Jordan River, the Yarmuk River. The monograph gives the figures below which have been provided by Channel Four Dispatches and dismissed by Israeli sources as exaggerated:50/

Table 1

Yarmuk River water resources:
Planned allocation, 1953 and estimates of the allocation in 1990
In millions of cubic metres

| | 1953 Yarmuk River allocation | Estimates of water received in 1990 |
|---|---|---|
| Israel | 25 | 100 |
| Jordan | 275 | 120 |
| Syrian Arab Republic | 90 | 170 |
| | 390 | 390 |

Source: Gulf Centre for Strategic Studies, Staff Report, vol. 17, January 1991.

According to an article by Mr. Harmlani published in the Journal of Palestinian Affairs, entitled "Israel's water policy and its effect on the prospects for a political settlement", Israel claims to have rights to between 25 and 40 million cu m of the waters of the Yarmuk River.51/

Ever since the end of the First World War, in the context of drawing the frontiers of the Mandatory territories, the protection of the use of the Jordan River basin water resources was the subject of international agreements such as the British and French agreements of the early 1920s, which stipulate that existing water rights of the region's inhabitants remain unimpaired.52/ For instance, the agreement of 3 February 1922 between France and the United Kingdom states that the inhabitants of Syria and of the Lebanon shall have the same fishing and navigation rights on Lakes Huleh and Tiberias and on the River Jordan between the said lakes as the inhabitants of Palestine, and that any existing rights over the use of the waters of the Jordan by the inhabitants of Syria shall be maintained unimpaired. Over the decades, numerous plans have been drawn up for the utilization of the water resources of the Jordan River basin. The following page contains a chronological list of such development plans as presented in the report of 25 November 1980 of the Security Council Commission established under resolution 446 (1979). None of the basin-wide plans were ever implemented and the agreement between Jordan and the Syrian Arab Republic concerning the utilization of the Yarmuk waters signed at Damascus on 4 June 1953 does not reflect an allocation for the West Bank on which to base an estimate of amounts of water subsequently diverted by Israel.53/ The nearest to succeed was the Johnston/Main Plan of 1953-1955. Mr. Dillman, a legal expert, discussed the recent history of water development in the Jordan River basin leading to the formulation of that plan as follows:

> "After the partition of Palestine, Israel began work on its water projects, and in 1953 it started construction on the first phase of the National Water Carrier Project. This plan followed the basic outline developed by Lowdermilk and Hayes. When Israel began work diverting the Jordan River, Syria complained to the Security Council, charging Israel with violating their cease-fire agreement. The United States censured Israel and threatened to cut off aid, then amounting to about $50 million a year.
>
> "One of the basic issues in the conflict between Israel and the Arab States concerns whether the waters of the Jordan River should be used only within the watershed or outside of it. All Arab plans provide for the use of the waters within the Jordan Valley; the Israeli plans call for using the water to irrigate other areas, primarily in the

Table 2

Proposed water development plans, 1939-1964

| Water Development Plan | Year Proposed |
|---|---|
| Ionides Survey | 1939 |
| Lowdermilk Proposal | 1944 |
| Hays Plan | 1948 |
| MacDonald Report | 1951 |
| All Israel Plan | 1951 |
| Bunger Plan | 1952 |
| Israeli Seven-Year Plan | 1953 |
| Johnston/Main Plan* | 1953 |
| Cotton Plan* | 1954 |
| Arab Plan (revised)* | 1954 |
| Baker-Harza Plan | 1955 |
| Unified Plan* | 1955 |
| Israeli Ten-Year Plan | 1956 |
| National Water Plan[a/] | 1956 |
| East Ghor Canal Project[b/] | 1958 |
| Arab Headwater Diversion | 1964 |

* Regional development plans.

a/ The plan became operational in 1964 and was to be completed by 1969.

b/ The project became operational in 1961.

Source: Security Council Commission report (S/14268) of 25 November 1980.

Negev. President Eisenhower sent his special envoy Eric Johnston to attempt to mediate a solution to the conflict. Johnston proposed a water plan prepared by Charles Main. Both the Arabs and Israel objected to the plan and developed their own counter proposals."54/

Although it was not ratified by the Council of the Arab League, the Johnston Plan's proposed water allocation, Jordan 52 per cent, Israel 30 per cent, Syria 9 per cent and Lebanon 3 per cent, has provided a lasting guideline, states the article by Mr. Anderson in Arab Affairs.55/ The article continues that the major water development project by Israel was the

construction of the National Water Carrier from Lake Tiberias in the north to the Negev in the south. The Israel National Water Carrier opened on 10 June 1964 and has an augmented average annual flow of approximately 420 million cu m through open canals (the Jordan and the Netofa canals), tunnels (Menashe A and B, Shimron and Eilabun) and water reservoirs (Tsalmon and Eshkol) and a pipeline.56/ According to Israeli and United Nations sources, the system also channels water for artificial replenishment and underground storage. During the winter season, water from the Jordan conduit is recharged into the aquifers in the central part of Israel. Two installations recharge water from seasonal streams through spreading grounds into the coastal aquifer. A total of 80 to 170 million cu m per year, depending on the annual rainfall, is thus recharged into aquifers for seasonal and long-time storage.57/

Other Israeli diversion projects

Controversies regarding the diversion by Israel of the Jordan River basin water resources continue, more recently also owing to the expected ecological damage affecting the river basin and downstream users. An article in The Other Front, published by the Alternative Information Center, Jerusalem, on 6 June 1991, reports on the wave of protests against a major project diverting in Israel the water of the Jordan River:

> "Kibbutz Kfar Hakasi, which is situated on the banks of the Jordan River, in cooperation with private investors, began excavation work a few months ago preliminary to building a generating station which would supply electricity to the kibbutz and its environs, and to creating a recreational lake. The kibbutz had received all the appropriate permits for beginning the work, but despite this fact, the commencement of excavation resulted in a wave of protest.
>
> "...
>
> "This project is not the first or only damage to be done to the Jordan River. Since the establishment of the State, the river has turned into a drainage ditch and sewage

channel. Only one small section remains in its original state, and that is the section under dispute.

> "We are talking about the diversion of a portion of the waters of the mountain section of the Jordan. The project will divert between one quarter and one third of the Jordan's water via a canal, to a reservoir from which it will be returned to the river via power-generating turbines."58/

Other major projects affecting Palestinian rights in the area of water resources and their development have been reported. The plan for a Mediterranean-Dead Sea canal involving the Gaza Strip and the western shore of the Dead Sea has caused international concern as it would have led to direct irreparable damage to the rights and the legitimate vital interests of the Palestinian people. In 1980, the report of the Security Council Commission established under resolution 446 (1979) stated the following:

> "Information was also received about a decision taken last August (1980) by the Israeli Cabinet by which it had approved in principle a plan to construct a canal connecting the Mediterranean Sea with the Dead Sea. The proposed route for that canal would start at the village of Katif in the Gaza Strip north of Khan Yunis, and run in a south-eastern direction across the Negev desert to Ein Bokek on the Dead Sea. Full details of the plan and the impact of the canal are not yet known. However, the Commission feels it appropriate to draw the Council's attention to the plan which, according to data reported to the Commission, might, through a drastic rise in the water level, alter the mineral content of the Dead Sea and damage its ecology..."59/

Regarding Israel's plan to build a canal linking the Mediterranean Sea to the Dead Sea, the General Assembly demanded in 1981 that Israel not implement its project of constructing such a canal and decided, in its resolution 40/167 of 16 December 1985, to resume consideration of this issue in case activities by Israel relating to the planned canal are revived. According to the August 1990 issue of Innovation, a monthly report on industrial research and development and science-based industry in Israel, Mr. Yuval Ne'eman, Minister of Energy and Infrastructure and Minister of Science and

Technology, called for the renewal of efforts towards the construction of a Mediterranean-Dead Sea canal.60/

Another large-scale project, affecting the groundwater resources of the West Bank, caused outrage in the mid-1980s. A multi-million dollar drilling project, unprecedented in depth and scale, was planned by the United States-based firm Moriah Technology and Energy Company, the Israeli Water Commission and Mekorot, the Israel Water Company, for the area southeast of Bethlehem. According to the Jerusalem Post of 28 June 1987,

> "[o]utraged Arab mayors in the Bethlehem area yesterday pledged to fight this major Israeli water-drilling scheme in the region, and the Civil Administration said it would demand guarantees that the project would not harm the water supply of neighbouring Arab communities.
>
> "The project, to be sited near Herodion, southeast of Bethlehem, is expected to lead to the pumping of 18 million cubic metres of water annually for use mostly in Jerusalem and Jewish settlements (12 million cu m). Sources associated with the project have said it could deplete the water in wells used by Arab communities in the area, while only making a small quantity of the pumped water available to the Arab villages and towns (6 million cu m)."

A report published by the Gulf Centre for Strategic Studies, London, entitled "Water: The Middle East problem of the 1990s", stated that the project was abandoned after international protests:

> "United States Government officials warned that such a project would violate international law as it would involve the transfer of resources from an occupied area to the territory of the occupying Power."61/

A letter dated 20 September 1991 from the Permanent Observer of Palestine to the United Nations, addressed to the Secretary-General, refers to a report that Mekorot (the Israeli Water Company) is on the verge of drilling yet another water well in the Bethlehem area, making it the fifth well drilled to satisfy the needs of the residents of West Jerusalem.

The depletion of Palestinian wells and water tables in the occupied Palestinian territory as a result of deep-bore drilling activities by the occupying Power continues to be a major concern for the Palestinian people. A recent United Nations report indicates, as will be discussed below in the section on settlements, that the deep wells drilled by the Israeli authorities in the occupied Palestinian territory, mostly for the benefit of Israeli settlers, have affected the level and quantity of water in Palestinian wells, resulting in a reduction of their productive capacity, including the drying up of some of the wells, and the drying up of agricultural land that depended on those wells for irrigation water.62/

## B. Effects of annexation, land and settlement policies on the Palestinian water economy

Article 47 of the Geneva Convention relative to the Protection of Civilian Persons in Time of War, of 12 August 1949, (the Fourth Geneva Convention), the first article in section III on occupied territories, reads as follows:

> "Protected persons who are in occupied territory shall not be deprived, in any case or in any manner whatsoever, of the benefits of the present Convention by any change introduced, as the result of the occupation of a territory, into the institutions or government of the said territory..., nor by any annexation by the latter of the whole or part of the occupied territory."

In contravention of the Convention, to which Israel is a high contracting party, Israeli law has been extended to occupied territory in East Jerusalem and West Bank areas adjacent to Jerusalem (1980) as well as the Syrian Golan Heights (1981), changing, as a result, existing water rights and institutions.63/

As regards the occupied Syrian Golan, the General Assembly, during the 1980s and early 1990s, strongly condemned the imposition by Israel of its laws, jurisdiction and administration, its annexationist policies and practices, the establishment of settlements, the confiscation of lands, and the diversion of water resources. The General Assembly has also declared that all these measures are null and void and constitute a violation of the

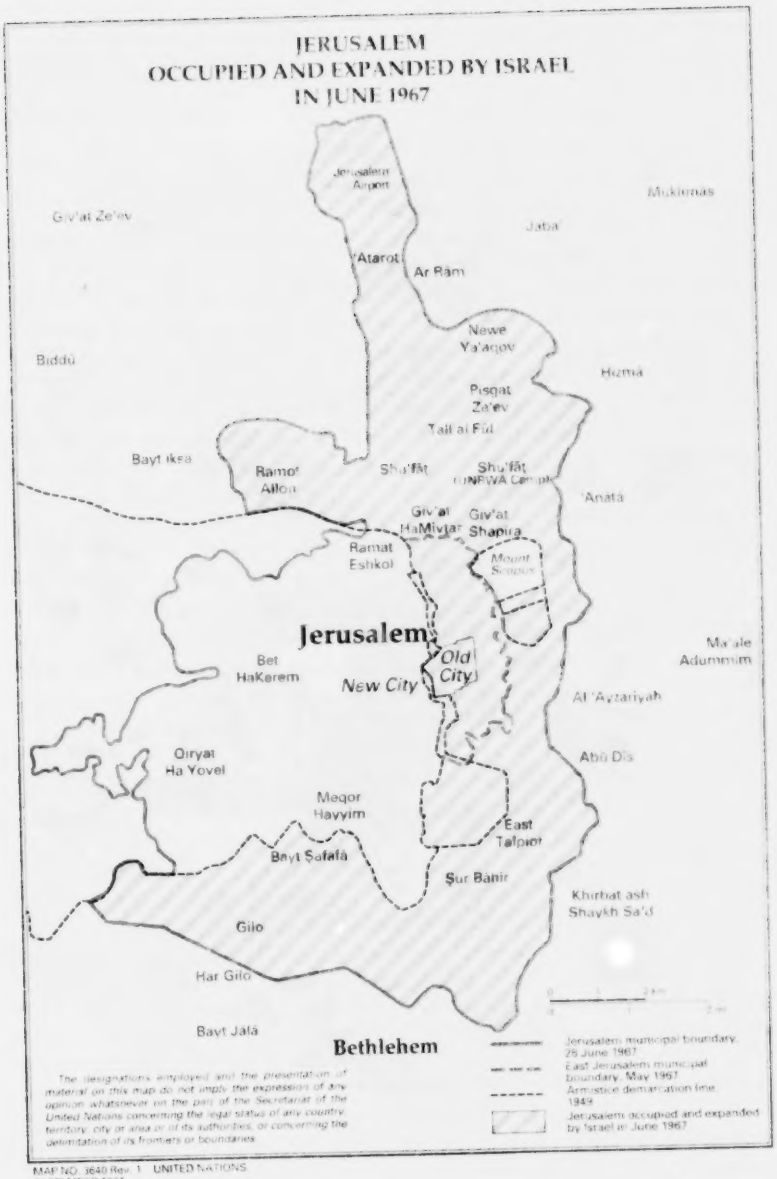
rules and principles of international law relative to belligerent occupation, in particular the Fourth Geneva Convention.64/ According to Ms. Schmida, researcher at the America-Mideast Educational and Training Services (AMIDEAST), Washington, D.C., in 1978 Israeli settlements in the Golan Heights were importing 80 per cent of their water, pumped from Lake Tiberias over a height differential of 600 metres.65/ Information contained in a 1991 ESCWA report indicates the following consumption figures: Israel estimates that the water needs of its settlements in the Golan, according to their plans, will reach approximately 46 million cu m per year, distributed as follows: (i) 8.7 million cu m per year for settlements in the north of the Golan; (ii) 6.0 million cu m per year for settlements in the centre of the Golan; and (iii) 31.6 million cu m per year for settlements in the south of the Golan. The expected sources of water are: (i) 16 million cu m per year from Lake Tiberias; (ii) 11 million cu m per year from the Hemmah springs and from the River Jordan; (iii) 10 million cu m per year from wells and springs in the Golan Heights; and (iv) 9 million cu m per year from the construction of small dams to collect runoff.66/ In the early 1980s two Israeli authors argued that the future utilization of 6 to 7 per cent of the Jordan basin's total water yield for the Golan Heights settlements was not expected to cause major problems or shortages.67/ The quantitative effects of these actions on existing user rights downstream on the West Bank, compounding Palestinian water security concerns, require further attention.

On the West Bank, despite protests by the international community and in violation of Security Council and General Assembly resolutions, Israel extended in July 1980 its basic law to Jerusalem occupied and expanded into West Bank communities in June 1967, involving a change in the character and status of occupied territory. Palestinian water users there and in other West Bank towns such as Ramallah are being steadily connected to the Israeli supply system, often against their will. Instances have been cited by residents of the occupied territories whereby as alternatives to permission for sinking wells, the applicants have been offered the option of purchasing water from newly established Israeli settlements or hooking up to the water grids that are being set up to supply the settlements. According to a United Nations report, the affected Palestinian communities have vigorously resisted these options as affronts to their sovereignty over their own natural resources.68/ The supply of water from Israeli networks is similarly controversial. For instance, the Jerusalem Post of 23 July 1990 reports that th Jerusalem municipality has substantially reduced the water supply to the W . Bank village of Al-Ayzariyah, as confirmed by a municipal

spokeswoman a day earlier. This was the second time in 1990 that the city of Jerusalem had cut by about 75 per cent the water available to a Palestinian area.69/

Disregarding the wishes of the Palestinian people, the Israeli water authority has been working for over a decade on the integration of the West Bank water system into large regional plants linked up with the Israeli water system. In 1982, the separate West Bank water system, which had been under military government management since 1967, was handed over to the Israeli national water company, Mekorot, to carry out the "take-over", stated Mr. Benvenisti in his 1986 report on developments in the West Bank.70/ A United Nations report by a team of experts found that the integration of the basic water services in the occupied territories with those of Israel is about to lead to the complete dependence of the former services on those of Israel and will eventually make the separation of the two very costly and difficult.71/ As a result of such integrative measures, the occupying Power has extended its leverage on the civilian Palestinian population in time of heightened tension and conflict, illustrated in particular by the events connected with the intifadah.

A full-page public service announcement presented by the Israeli Ministry of Agriculture in the international edition of the Jerusalem Post of 19 August 1990 elaborates on Israel's perceived need to control completely the use of water resources originating in the West Bank through the permanent occupation of that territory. According to the announcement, "excessive pumping or uncontrolled sewage and waste disposal in Judea and Samaria are liable to cause serious depletion, salination and pollution of the aquifers. Relinquishing the western slopes of the Judean and Samarian hills will create a situation in which the fate of the Israeli national water supply could be determined by the actions of whatever Arab authority controlled the evacuated areas after withdrawal". The text published by the Ministry of Agriculture concludes that "it is difficult to conceive of any political solution consistent with Israel's survival that does not involve complete, continued Israeli control of the water and sewage systems, and of the associated infrastructure, including the power supply and road network, essential to their operation, maintenance and accessibility".

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Land

According to Mr. Efraim Inbar, author of War and Peace in Israeli Politics, since the mid-1970s Israeli policy makers have identified tracts of land for settlement in the West Bank which they consider as indispensable to meet Israel's water requirements, not to be relinquished even in the event of a peace settlement.72/ Mr. Schiff, an Israeli defence analyst, argues that the danger to the large Yarkon-Taninim underground water reservoir stems mainly from drilling on the western slopes of the West Bank. Israeli water experts state that for them the critical strip of land in this regard extends beyond Israel to the foothills of these slopes in the occupied Palestinian territory, and penetrates as far east as the vicinity of the village of 'Anabta, in the Tulkarm-Qalqilya area. It has been estimated that this strip of land extends for a distance of 2 to 6 kilometres east of the Green Line. Israel must retain this strip in order to limit the possibility of acute friction over water resources, writes Mr. Schiff.73/

Since 1967 Israel, the occupying Power, has taken some 50 per cent of the land of the occupied Palestinian territory, including its assets such as access to water. The value of the remainder of the land depreciated when water rights were severed from title to land and made public property.74/ According to ESCWA figures, between June 1967 and the end of 1990 a total of 2,895,642 dunums (1 dunum - 1,000 square miles), representing approximately 52 per cent of the total land area of the West Bank, and a total of 153,475 dunums, representing approximately 43 per cent of the total land area of the Gaza Strip, were expropriated by Israel.75/ Some of this land was taken by Israel in connection with the use and conservation of water resources, other land was seized to provide Israeli settlers with water. For instance, information contained in the 1986 Israeli State Comptroller report on activities in the occupied territory indicates that Mekorot seized several dunums of land in the West Bank in 1986, drilled for water and laid water pipes for a Jewish settlement without receiving proper approval and without compensating local Palestinian landowners. The Comptroller's report noted that compensation had since been offered.76/

Prior to the Israeli occupation, the powers of the Government to declare "protected" or "restricted" zones or areas, preventing Palestinians from using their land and water resources, were exercised only exceptionally; on the basis of Israeli legislation, a large number of "special zones or areas" may be declared, such as "protection strips", "rationing

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areas", "drainage districts", and "flood and soil erosion protected areas"; in addition, "security military areas" may also be imposed in the occupied territories.77/ Owing to the sealing off of many agricultural areas as "closed security areas", several hundred water pumps owned by Palestinian farmers, which were used to pump water from the Jordan River to irrigate their farms in the Ghor region of the West Bank, have been destroyed and irrigation canals which supplied Palestinian farms in the Jiftlik region have been damaged.78/ Moreover, under no circumstances are Palestinian inhabitants permitted to drill wells close to the borders of Israel; the rejection of such a request by the inhabitants of Nablus was noted.79/ A witness from the Gaza Strip made a statement in this connection before the Special Committee to Investigate Israeli Practices Affecting the Human Rights of the Population of the Occupied Territories:

> "There is also the problem of water. Of course, all over the world there are water problems, but the Israeli authorities have forbidden anyone to dig a well to irrigate his citrus groves because 'Gaza had no water'. But at the same time, ten metres away on the other side of the 1967 border, they will dig not one well but ten. I myself have a farm and they have prevented me from digging a well on my own land, on the pretext that there is not enough water."80/

Settlements

Since Israeli occupation began in 1967, Israeli settlements have been established in the Palestinian territory and permitted to consume local water. In its January 1991 Report on Israeli Settlement in the Occupied Territories, the Washington-based Foundation for Middle East Peace states that the current total of approximately 220,000 Israelis living in occupied territory (120,000 in East Jerusalem; 100,000 elsewhere) will almost double within three years if, as was estimated, immigration to Israel reaches 1 million persons and 15 per cent settle in the Palestinian territory occupied by Israel since 1967, including Jerusalem. An article in the Jerusalem Post of 5 September 1986, attempting to show the "brighter side of Gaza", stated that:

> "[u]nder the circumstances, there was little justification for putting Jewish settlers in the territory or allowing them generous water supplies... The gain to the Jewish settlements was certainly a loss to the local community".81/

Similarly, Mr. Schiff, an Israeli defence expert, stated that Israel erred when it permitted Jewish settlements in the Gaza area to draw water from local sources instead of supplying them with water from inside Israel. In doing so, Israel accelerated the exploitation of Gaza's meagre reservoir and will be at least partially responsible for future water shortages.82/ Regarding the West Bank, an expert attached to the Palestinian Hydrology Group was quoted as saying that "You don't find a Jewish settlement without water, but you will find hundreds of waterless Palestinian villages".83/

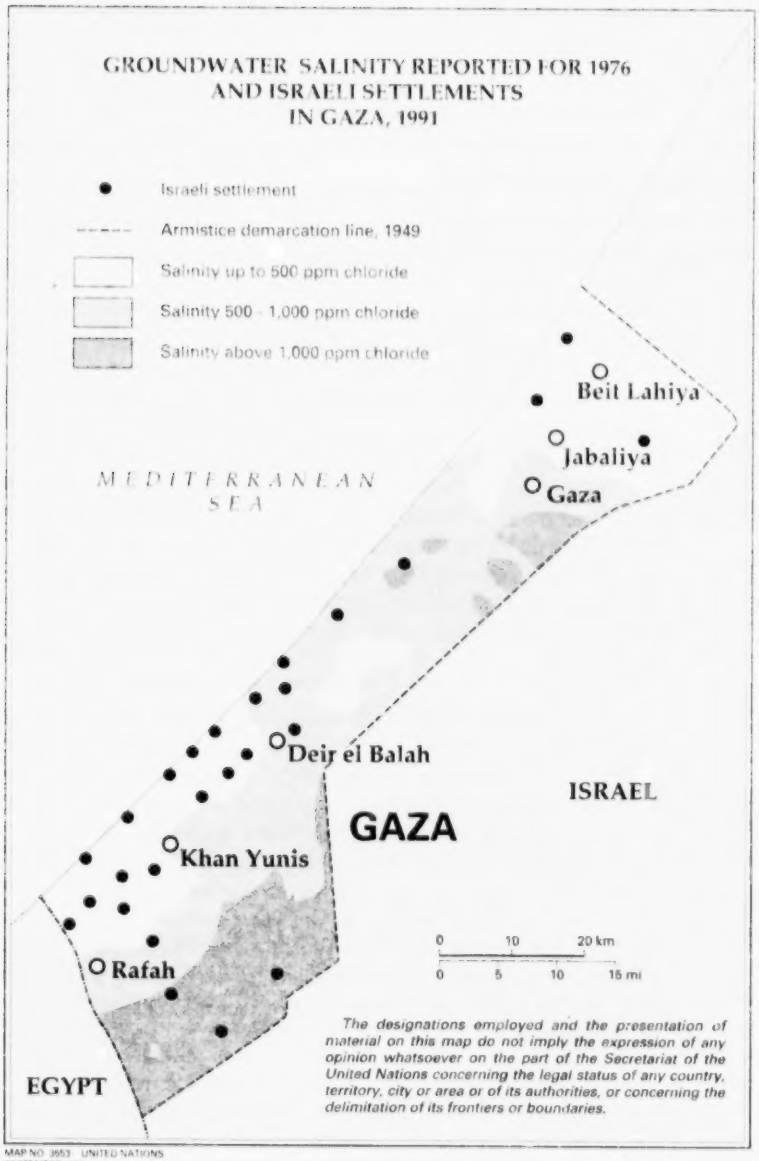
Israeli settlements are often found on the most suitable sites in terms of abundance of groundwater and soil quality.84/ For instance, a comparison of the salinity and settlement maps of the Gaza Strip reveals that many Israeli settlements have gained access to those areas with relatively good water quality.85/ Ms. Roy, an expert on Gaza working with Mr. Benvenisti's Data Base Project, found that the main water reservoir of Gaza is located in the north of the Gaza Strip, an area of Israeli settlement, not accessible to Palestinians.86/ Other reports indicate the direct interference with the water supply of Palestinians by the occupying Power to protect the water supply of Israeli settlers. For example, an article in Foreign Policy stated that many existing wells have been blocked or sealed by the occupation authorities, in some cases to prevent their use from draining nearby Jewish wells.87/ According to Mr. Harmlani, writing in the Journal of Palestinian Affairs, the Israeli occupation authorities closed in this connection 25 artesian wells outside Zawabidah and 42 wells in the Rafah area.88/

By contrast, many Israeli wells have reportedly been drilled in close proximity to existing Palestinian wells and springs, with a most detrimental effect on the quality and quantity of water made available to Palestinian inhabitants. In some cases, village wells and springs have dried up altogether. In the Security Council Commission report of 25 November 1980 specific references were made in that regard to the villages of Al-Auja, Ramallah, Al-Bireh, Bardala, Tel-el-Beida, and Kardala whose water supply had been drastically diminished owing to the new wells dug up for Israeli settlements within a few hundred metres of the existing Palestinian springs

or wells.89/ The sinking of deeper wells by the occupation authorities in order to supply the needs of the newly created settlements has been one reason for the falling water tables in the West Bank which has allowed saline water to seep in from the saline belts in the areas north-west of the Dead Sea; in Jericho the significant increase in the salinity of water pumped from wells has been linked to two wells sunk by the Israeli Government near the existing well serving Jericho.90/

Mr. Gwyn Rowley, an expert on hydrology, described the problem of "leaking aquifers" in the context of the West Bank as follows:

> "On the West Bank the deep-bore wells with powerful pumps, referred to locally as 'Jewish wells' have been developed down to some 300-600 m below the surface, and even lower in certain localities... [W]hile initially a number of these wells were set down to only *c.* 100-150 m with declining flows being recorded, the wells were and are being drilled to deeper and indeed deepening levels that are now becoming the norm. However, while it is to be emphasized that in no way are we seeking to suggest that abstraction from the lower aquifer is causing any depletion of the upper aquifer, the 'leaking-aquifer' problem is recognized as a considerable hydrological problem.
>
> "Elsewhere it has been shown that the extent of the cone of depression can be as great as 16 km from the pumped well. Where a number of these deep pumped wells are working, their intersecting cones of depression produce a general lowering of the water table and the traditional wells are left literally high and dry. As a result, pastures may dry out or pastures that traditionally would have provided grazing for six years out of seven may now fail three or four years out of seven. Not only is the quantity of water severely depleted in the traditional wells, but the quality and salinity of the water may change quite dramatically...".91/


GROUNDWATER SALINITY REPORTED FOR 1976
AND ISRAELI SETTLEMENTS
IN GAZA, 1991
Israeli settlement
Armistice demarcation line, 1949
Salinity up to 500 ppm chloride
Salinity 500 - 1,000 ppm chloride
Salinity above 1,000 ppm chloride
Beit Lahiya
Jabaliya
Gaza
MEDITERRANEAN SEA
Deir el Balah
ISRAEL
GAZA
Khan Yunis
Rafah
EGYPT
0 10 20 km
0 5 10 15 mi
The designations employed and the presentation of material on this map do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.
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Israel acknowledges that unintended interference with upper water tables has occurred on the West Bank. Israel indicated that where any new well sunk for the use of the Jewish population caused the yield of an existing source of water of Palestinian villagers to diminish, care has been taken to make good the deficiency from the new source at the same cost as would have been incurred by the Palestinian users in producing the quantity in question from their own source.92/

Substantial inequalities between Israeli settlers and the Palestinian population in the areas of water administration, investment, pricing and planning have been widely reported. In this regard, the following conclusion was reached by a United Nations team of experts in the early 1980s:

> "Given the apparent Israeli objective of preventing increases in the use of water in the West Bank in order to protect the flow of water from the West Bank to the Israeli aquifers and given the Israeli policy to support fully the water needs of settlements, it is difficult to see how the water management system that has been established can operate without discrimination."93/

The United States Department of State indicates in its Country reports on human rights practices for 1990 that:

> "Israeli law has been extended to cover most activities of Israeli settlers who live in the occupied territories, while Palestinians live under military occupation law. Under the dual system of governance, Palestinians--both Muslim and Christian--are treated less favorably than Israeli settlers on a broad range of issues, including the right to due process, right of residency, freedom of movement, sale of crops and goods, land and water use...".94/

Mr. Naff, water expert at the University of Pennsylvania, stated before the Subcommittee on Europe and the Middle East of the House Committee on Foreign Affairs in Washington, D.C. on 26 June 1990 that he does not know of any formal restrictions on the use of water placed on Jewish settlers in the occupied Palestinian territory.95/ Mr. Gruen, adjunct professor of international relations, in his written statement to the same Hearing states

that, "[a]lthough everyone needs a license to dig new wells, in practice the Jewish settlements have had no similar restrictions placed on them."96/

The 1984 report of a team of experts, mentioned above, details that a special regime has been established in favour of "planned settlements", entitled to a water allocation for irrigation purposes as collective users, as opposed to the individual allocations made with respect to all other users. Although the internal distribution of water is left to the discretion of the settlement corporation, it is worth noting, states the report, that if a settlement does not use its annual quota, it may receive its entire water allocation in the following year.97/ Moreover, Mekorot, the Israel Water Company, received permission to drill approximately 30 deep-bore artesian wells with an average yield of 1,640 cu m to serve the new settlements established in the occupied territories.98/ Although permits are sometimes granted to Palestinians to drill domestic wells in depths not exceeding 60 metres, yielding an average 115 cu m, Israelis in the settlements are allowed to drill to depths of up to 500 metres.99/ Mr. Ze'ev Golani, Water Commissioner on the West Bank, 1970-1978, said in an interview published in the economic review South of August 1991 that Palestinians applying after 1978 for permission to drill into the deep aquifer have been refused because that aquifer, like the shallow aquifer traditionally used by Palestinians, was by then fully utilized, practically all by the Israeli settlements. According to the information in the Jerusalem Post of 5 September 1986, between 35 and 40 Israeli wells in the eastern Gaza Strip have diverted part of the area's natural recharge.100/

Published sources indicate that the Israeli settlements receive comparatively generous governmental investments for the development of water resources as well as subsidies through funds made available by the Jewish Agency and the Jewish National Fund for the planning and development of water schemes and equipment.101/ For instance, according to a table published by Mr. Benvenisti and Mr. Khayat, in the mid-1980s alone the annual investment for settlements by the Israeli Government for water, main and local grids, was as follows: $122 million in 1982, $142 million in 1984 and $162 million in 1986.102/ By comparison, for the 10-year period 1975-1984, the foreign financial assistance extended to the Palestinian people living in the West Bank was reported to be in the region of $52 million,103/ and the expenditure of West Bank towns in the area of water for the budget years 1986/87 and 1987/88 was reported by Israel to be in the region of NIS 8.4 million (approximately $5.7 million) and NIS 8.7 million, (approximately $5.9).104/

Pricing policies reveal a further inequality between the Palestinian population and Israeli settlers. Israel emphasizes that the Mekorot Water Company supplies water at rates varying according to the geographical, geological and hydrological factors influencing the cost of supply, and most certainly not on the basis of religion or nationality of users.105/ According to the findings of the 1986 report of the Israel State Comptroller on government activities in the occupied territories, Israeli settlers, whose water bills are institutionally subsidized by the World Zionist Organization, paid the Mekorot Water Company 15 and 23 agurot (approximately $.10 and $.16) per cu m of water for agricultural and domestic use respectively.106/ However, Palestinian consumers paid what Israel calls the "Civil Administration", created by the Ministry of Defence, 70 agurot (approximately $.48) per cu m of water supplied by Mekorot. Moreover, Palestinians, as compared to Israelis, do not receive a lower rate for agricultural use, which constitutes the bulk of water consumption.107/ Information contained in a paper entitled "Israeli plans to appropriate Arab water", presented to the Conference of Officials in Charge of Palestinian Affairs in the Arab Host Countries by the Economic Department of the Palestine Liberation Organization, indicates that in May 1989 the Israeli occupation authorities decided to raise the water price in the occupied Palestinian West Bank from 90 agurot per cu m to NIS 1.4, and sell water to Israeli settlements at about 25 agurot per cu m.108/ In other words, the Palestinians are required to pay 5-1/2 times as much for water as compared to the Israelis.

Owing partly to the low price settlers pay for water, Israeli and other sources note the excessive and inefficient use of water by the settlements.109/ For example, the 1986 Israeli State Comptroller's report found that in fiscal year 1984/85 the Jordan Valley's Jewish settlements exceeded the use of their water quotas by 35.6 per cent, while settlements in what it calls "Judea" exceeded the use of their quotas by 44.8 per cent. Together, settlements in the two regions used over 36 million cu m of water compared with the 26.6 million cu m allotted to them. The water company, Mekorot, which supplies the Jewish settlements with water, exceeded its pumping quota in the Jordan Valley by about 20 per cent - taking some 260,000 cu m of water above its annual 700,000 limit in 1985/86. This occurred despite recommendations by the water authority to reduce consumption so as to avert the danger of salinating local water supplies. The report noted "inexplicable" water losses of 41 to 44 per cent in 1983 and 1984 in two Jewish settlements. The Comptroller concluded

that the Civil Administration did not oversee Mekorot's activities sufficiently.110/

Regarding the relatively inefficient use of water by the Israeli settlements, Mr. Kahan, an expert at the Israeli West Bank Data Base Project, gives the following example for the Jordan Valley and North Dead Sea region:

> "In that region, the consumption of water for the irrigation of one dunum measures 1,342 million cu m in the Israeli settlements and 712 million cu m in the Arab villages. These figures reveal the contrasting levels of intensity of water use."111/

According to official water development plans, as stated by Mr. Benvenisti in the mid-1980s, Palestinian water consumption in agriculture will not be allowed to expand even by the year 2010; by contrast, the amount of water available for Israeli settlement agriculture (mostly in the Jordan Valley, but also in the Etzion Bloc and southern Mt. Hebron) would increase by more than 100 per cent during the 1980s. In 1990, 60 million cu m of water will be available to some 30 Israeli agricultural settlements, only one third less than the 90-100 million cu m available to 400 Palestinian villages. The planned supplement to the Palestinian sector is intended for domestic use only, to meet the increased demand due to population growth: according to forecasts, the Palestinian annual per capita consumption will increase gradually from 35 to 50 cu m in towns and from 15 to 25 cu m in villages by 1990, and to 60 cu m and 35 cu m, respectively, by the year 2010. The planned level of per capita consumption in the Jewish settlements has been fixed at 90 cu m.112/

The quantity of water available for Palestinian use will remain at approximately 23 per cent of the water potential of the West Bank. The total amount of water for both agricultural and domestic consumption planned for allocation to the estimated 1 million Palestinians at the end of the 1980s is 137 million cu m per year, while approximately 100 million cu m will be made available to about 100,000 Jewish people.113/

In the late 1980s, the situation in the occupied Palestinian territory was feared to worsen as a result of the large-scale immigration of Jews from the Soviet Union and elsewhere to Israel. According to Le Monde Diplomatique of October 1991, between January 1990 and September 1991,

over 300,000 new immigrants reached Israel. The international community was concerned that the Government of Israel would direct large numbers of these immigrants to the occupied Palestinian territory, including Jerusalem, or cause an equally large number of Israelis to settle there. A remark made by Mr. Yitzhak Shamir, Prime Minister of Israel, on 15 January 1990, regarding the need for a "big Israel" required by the large number of expected immigrants, and the plan by Mr. Ariel Sharon, Housing Minister, to build thousands of new housing units on the West Bank, including Jerusalem, caused apprehension. An estimated 6-10 per cent of the new immigrants to Israel settle in the occupied Palestinian territory.114/

According to reports in the Israeli media during March and April 1991, the Israeli Government expenditures relating to the occupied Palestinian territory budgeted for the fiscal year 1990/1991 were much larger than those in previous years. For instance, the budget component of the Construction and Housing Ministry earmarked for the West Bank and Gaza Strip exceeds 1.1 billion NIS (approximately half a billion United States dollars). The New York Times of 24 April 1991 reported that over 20 per cent of that Ministry's entire budget was being spent on settlement activity in the occupied Palestinian territory, even though only some 2 per cent of Israelis resided there.

Mr. Efraim Finebloom, the managing director of Mekorot, Israel's largest water supplier, expressed the view, as reported in the Jerusalem Post of 12 July 1990, that the growing water crisis is a "catastrophic situation" which will worsen if immediate steps are not taken. "A new programme is needed to provide enough water for the 2.5 to 3 million new immigrants we are expecting in the next few years," he said; "The newcomers will be putting an added strain of 650 million cu m on the national water supply."115/ Mr. Naff, professor at the University of Pennsylvania, stated before the aforementioned Congressional Hearing in 1990 the following:

> "The waters of the occupied territories are already being over-exploited at the rate of about 150 million cu m per year. Allowing large number of émigrés to settle there would only intensify current problems.116/

Regarding future increases in the demand for water in the region, the Israeli public service announcement referred to earlier, published in the Jerusalem Post of 19 August 1990, expressed the Ministry of Agriculture's view on the

possible repatriation to the "proposed Palestinian political entity, whether sovereign or autonomous", of Palestinian refugees in the following terms:

> "Relinquishing control over Judea and Samaria will leave Israel without any legal, moral or practical means to prevent the repatriation of almost a million Palestinians resident in refugee camps in surrounding Arab countries, whether by their own free will or by forcible 'transfer' by their reluctant Arab 'hosts'. Such a wave of poverty-stricken humanity would generate an impossible strain on the already over-extended water supply and inadequate sewerage system, endangering even further Israel's vulnerable and fragile source of life..."

Yet, a recently revised Israeli Government planning document, "The Ordinance Plan for Population Dispersal in Israel" envisions a Jewish population of 250,000 in the West Bank and Gaza Strip by the year 2010, as indicated in the July 1991 Report on Israeli Settlement. The plan was prepared by the Interior Ministry's planning administration, which is responsible for population forecasts. It is a document used by regional and ministerial authorities to guide long-term planning and development strategies. Originally completed in 1984, the plan estimated that Israel's population (including the entire population of Israel and annexed Jerusalem, but only the Jewish population of the occupied territory) would reach 7 million persons by the year 2020. As a consequence of an anticipated immigration of 1 million people, Israel's population is now expected to reach this plateau by the year 2010. According to the Report, part of the planned population increase to about 250,000 settlers in the occupied Palestinian territory is based on immigration - in contrast to the official declarations that immigrants are not going to the territories.117/

### C. Legal and institutional constraints on the Palestinian water economy

Israel's water policy is managed through a maze of government agencies and organizations which are under pressure from various influential interest groups, stated Mr. Baskin, Israeli director of the Israel-Palestine Center for Research and Information in a recent article. At the top of the hierarchy stands the Minister of Agriculture, at the time Mr. Rafael Eitan.

Mr. Eitan has published full-page advertisements - both as minister and as member of the Tzomet Party - pointing out the dangers to Israel's water supply if Palestinians took control of the West Bank. Mr. Baskin suggested that the water needs of the Palestinians themselves are clearly the least of the Minister's concerns.118/

Legislation relating to water resources is enforced in the occupied territory by Israel utilizing and amending customary, Ottoman, Mandate, Jordanian, Egyptian, Israeli or military jurisprudence. Israeli policies, institutions and practices relating to water resources differ fundamentally from those in effect in the occupied territories before 1967. In particular, the proprietary rights as regards water that had been validly acquired under the pre-occupation legal regimes have since been subjected to curtailment to the full extent permitted by Israeli law on the subject.119/ The changes of major consequence that seem to have been effected relate to the following:

(a) The water rights held by the water users (water rights were severed from title to land and considered as public property);

(b) The water management responsibilities and water allocation; and

(c) The fact that the system of water management operates by decision of the Israeli authorities and not by voluntary cooperation and with the participation of the Palestinian inhabitants concerned.120/

Regarding basic water policies and principles, Israel argues that in fulfilling the relevant international responsibilities involved in its administration of the occupied West Bank and Gaza, it has made every effort to respond to the needs of modern economic development whilst refraining from disturbing the existing economic infrastructure. Israel has stated that, despite the fact that such international responsibilities enable regulation of the use of water, the Israeli Administration authorities have based their policy and practice regarding the utilization of water resources on a number of principles aimed solely for the benefit of local residents and for the development of agriculture, including the following:

> "(c) Secure the rights of existing irrigation water users by protecting their sources and by replacing deteriorating sources whenever an alternative is available;

"...

"(e) Supply irrigation water to Israeli villages and townships either by importing water curtailed from existing users of the Israeli National System, by tapping unused aquifers or by utilizing treated sewage;

"(f) Differences in water availability to users may result from hydrological constraints or from prior water rights. There is no legal discrimination between water users."121/

In the context of restricting the use of over-exploited aquifers, as in the Gaza Strip, Israel referred to its responsibility to preserve natural resources as follows:

"Israel administrative authorities, under their responsibility to preserve local natural resources, are taking steps to rectify the situation. Restrictions on groundwater exploitation in regions of acute deficits were introduced, as well as encouragement of water saving irrigation practices."122/

Military orders controlling comprehensively the Palestinian water resources and installations in the West Bank and the Gaza Strip include Orders No. 92 of 1967, No. 158 of 1967, No. 291 of 1968, No. 369 of 1970, Nos. 450 and 451 of 1971, No. 457 of 1972 and No. 498 of 1984. According to a 1991 ESCWA report on Israeli land and water policies and practices, the relevant Israeli military orders stipulate rules and regulations regarding water and water transfer, extraction, consumption, sale and distribution, the control of water use, water sharing and rationing, consumption of water, the construction of water installations, the drilling of wells, the granting of permits and all matters regarding water resources, whether groundwater or surface water, including springs, ponds, streams and rivers, as well as the setting of prices and quantities allowable for use by indigenous Palestinian inhabitants and farmers in the occupied territory. These orders have made it easier for the Israeli authorities and settlers to seize and utilize water in the occupied territories.123/ Also, according to the report of the Security Council Commission established under resolution 446 (1979) of 25 November 1980, wells belonging to Palestinians whom Israel calls "Arab absentee owners" are being used exclusively for

Israeli settlements.124/ Israel maintains that only in the case of a few "absentee owners" were the rights of the existing population to the use of water springs vested in the Custodian of Abandoned Private Property, who disposed of them partly to Palestinian farmers and partly to Jewish settlers.125/

According to the ESCWA report, on 15 August 1967 the Israeli military commander issued Order No. 92 of 1967 conferring on the military authorities Mandatory Powers in respect of water regulations. Water was considered as a strategic resource. This order was followed by numerous other orders aimed at making basic changes to the water laws and regulations in force in the West Bank and the Gaza Strip. The aforementioned United Nations team of experts report of 1984 noted the change in property rights pertaining to water resources in connection with Military Order No. 291 of 1968 in the following terms: whereas, under the earlier legislation and subject to certain qualifications, landowners could claim private ownership or equivalent vested rights in the waters on or under their land, this is not permissible under the Israeli water legislation, according to which all water resources, both surface and underground, are public property.126/ Military Order No. 291, changing from private to public the ownership of Palestinian water resources in conformity with the Israeli Water Law of 1959, which had nationalized water resources in Israel, is not consistent with the rights and obligations of an occupying Power under international law, states Mr. Dillman, a legal expert.127/ On its part, Israel has stated that Military Order No. 291 refers to the Jordanian Law No. 40 of 1952 on soil and water and merely authorizes the Military Commander to enforce it. Moreover, the principle of public ownership of unutilized water resources in what Israel termed "Judea and Samaria" also stems from the Jordanian legislation, article 59 of the Law of Natural Resources No. 37 of 1966 and not from Israeli legislation.128/ Israel objects to the interpretation that the Israeli legislation on water has been extended to what it called "Judea-Samaria and Gaza district".129/ In its view, the Jordanian authorities, having enacted the 1966 Law of Natural Resources that related also to the Palestinian water economy, had not implemented the law prior to June 1967.130/

Military Order No. 498 of 4 November 1974 deals with the water economy in the Gaza Strip.131/ According to a statement by Israel, the order issued concerning water in the Gaza Strip gives legal validity to arrangements concerning the use of water and includes the following provisions:

(a) It is forbidden to sink wells without the permission of the appropriate authorities;

(b) It is forbidden to plant new citrus groves without permission;

(c) The distribution of water for agriculture is according to the crops already being cultivated;

(d) It is obligatory to measure the water in all existing wells; and

(e) Problems between water consumers and well owners are to be settled.132/

The administration and management of water resources is another area mentioned in the 1984 United Nations report by a team of experts as having been subjected to modifications by the occupying Power. Under Israeli military occupation, local governments lost powers and responsibilities, including those relating to the assessment and collection of water rates, charges and levies. The Israeli system is regarded by experts as being highly centralized and not open to Palestinian participation. The report states that a certain degree of centralization of governmental responsibilities for water resource management existed in the occupied territory prior to occupation. For instance, according to a 1988 memorandum by Jordan, under the legislation in force prior to 1967, powers to regulate and distribute water in the West Bank had come within the purview of the Director of the Land Department and, in 1966, these powers were transferred to the Natural Resources Authority.133/ However, the team of experts report found that some functions in the management of irrigation water used to rest with the local governments and the bulk of responsibilities for the provision of domestic and municipal water supplies used to rest with the municipalities of the West Bank and the Municipal Council of the City of Gaza.134/ In the Gaza Strip, the system imposed by Israel is seen as even more restrictive because, prior to June 1967, no government-administered water permit system was in force there, and the right to take water was governed by customary law. This recognized the proprietary water-use rights of the landowner and the rights of all those who needed water for the basic necessities of life (right to satisfy thirst, *chafa,*

and right to irrigate, *chirb).* In addition, private arrangements could be freely entered into for the purchase and exercise of water-use rights.135/

Furthermore, the report by a team of experts indicates that governmental policies on the reimbursement by the beneficiaries of the costs of water development projects and on the provision of subsidies and incentives promoting water development activities differ from comparable policies and practices under the original domestic legislation of the occupied territory. Since Israeli policies and practices are enforced in the occupied territory and local Palestinian interests are not adequately represented in the public bodies responsible for relevant policy-making, financial hardship and discrimination may result for the affected Palestinian water users and consumers.136/

Throughout the 1980s, United Nations and other publications have expressed the view that the water problem in the occupied Palestinian territory was compounded by the fact that the Palestinians were not involved in the decision-making process affecting the use of water in the territories.137/ While public participation is granted to Israeli users through a variety of boards and institutions, Palestinians have no say in the formulation of water policies or in the decisions taken or advice given by the responsible bodies. Moreover, according to the same report, in the West Bank Military Order No. 291 of 1968 has in practice suspended the provisions of Jordanian Law No. 40 of 1952 on the settlement of disputes of law and water rights.138/ Although Israeli water legislation contains detailed provisions for appeals against decisions on the recognition of existing rights, the proclamation of "rationing areas", increases in water rates, the issuance or modification of water permits and licences, the promulgation of water-use norms and many other administrative determinations of the water management authorities, and Israeli literature emphasizes the special care taken by lawmakers to protect the rights of the individual and to ensure fair compensation in the case of justified claims as regards water questions, the appeals for review of these decisions are heard only by the Israeli authorities.139/

Since 1967, according to a report by the Security Council Commission established under resolution 446 (1979) mentioned earlier, the Israel Water Commission, through its Department of Water Allocation and Certification, has taken direct control of the water supply in the occupied Palestnian territory. The Israeli Water Commission and two companies

under its control, Mekorot (Israel Water Company) and Tahal (Water Planning for Israel Company), are entrusted with the supply and management of water resources. Mekorot has been given responsibility for all drilling operations for artesian wells throughout the occupied Palestinian territory.140/ According to the Encyclopaedia Judaica, Mekorot was established in 1937 by the Jewish Agency, the General Federation of Hebrew Workers in Eretz Israel (the Histadrut Federation) and the Jewish National Fund. A publication by Mekorot states that Mr. Levi Eshkol was the founder and first managing director of the company.141/ Following the Encyclopaedia's account, in 1962 Mekorot became officially Israel's national water supply company and in 1967 the Israeli Government and Histadrut each had a 33 per cent share in Mekorot, while the remainder was held equally by the Jewish Agency and the Jewish National Fund. Other published sources indicate that either the Jewish Agency and the Jewish National Fund or the Government of Israel have controlling shares of Mekorot.142/

Tahal was established, according to the Encyclopaedia Judaica, in 1952 by the Government of Israel, which holds the majority of shares (52 per cent). The Jewish Agency and the Jewish National Fund own equally the remaining shares. In 1961, Tahal established a subsidiary, Tahal Consulting Engineers Ltd., to undertake work on a commercial basis in Israel and abroad, states the entry in the Encyclopaedia.

The Israeli Water Board has been given responsibility for all operations regarding water distribution in the occupied Palestinian territory and it has been allowed to install water meters on the artesian wells owned by Palestinian farmers in order to control the quantities of water extracted.143/ According to published Israeli information, Palestinians are obliged to address themselves to the water staff officer of the military authorities for water-related permits and to make payments for water consumption through local officials who are often appointed by the Israeli occupation authorities.144/

Reports on conflicts over the day-to-day management of the water economy abound. Conflicts often focus on outstanding bills and Palestinian water installations. For instance, on 20 February 1991, the Land Research Committee of the Arab Studies Society, Jerusalem, issued information on a recent conflict involving water installations and wells in Beit Ula near Hebron. According to the information, on the morning of 17 February military jeeps and the Custodians of State Property of Bethlehem and Hebron

arrived with trucks and a bulldozer and started to demolish Palestinian wells and pumping systems, confiscating the motors and pumps. There was no protest from the agricultural department, who had informed the farmers that even if the pumps were removed, the wells should not be bulldozed. The Custodians said that they took responsibility for the action and that they would use force against anyone who stood in their way. The attack lasted from 7 a.m. to 4 p.m. That day, some farmers went to the agricultural department and called the water authority in Ramallah, which started a protest and, denying any responsibility, announced that it would carry out an investigation.145/

## II. RESTRICTIONS ON DEVELOPMENT ACTIVITIES REQUIRING WATER AND WATER-RELATED REPRESSIVE MEASURES

*Nothing will displace us Palestinians from here. We are like a forest. You can fell and uproot trees, but the forest will remain and grow. Instead of uprooting trees, Israelis will have to become trees, like Palestinians - part of the forest.*

*(Feisal al-Husseini to an Israeli interviewer)*

Legal and administrative constraints placed on Palestinians to use extremely limited amounts of water are supplemented with restrictions on any development activity requiring or involving water resources. For instance, since 1967, Israel, the occupying Power, has severely restricted the planting of trees and crops by Palestinian farmers to reduce their water consumption. The cumulative impact of these restrictive water-related policies has been particularly debilitating for Palestinian agriculture.146/ Moreover, throughout Israel's occupation of the West Bank and Gaza Strip, including Jerusalem, water resources and installations were used in the context of repressive measures directed by the occupying Power against the civilian Palestinian population. These measures, which further reduce Palestinian water consumption, will be discussed in section B below.

### A. Restrictions on agriculture and development efforts

Agriculture in the occupied Palestinian territory requires most of the meagre amounts of water consumed there. According to the West Bank Data Base Project, in the West Bank over 80 per cent, approximately 100 million cu m, and in the Gaza Strip some 90 per cent, approximately 110 million cu m, of the locally consumed water is being used in agriculture, mostly for irrigation.147/

The Jordanian 1964-1970 Development Programme had aimed at increasing the area of agricultural land in the West Bank in order to raise the level of income from agriculture and improve the standard of living of farmers by increasing agricultural production. The intention was to increase

the area of land under irrigation to 40 per cent of the cultivated area by the end of the Development Programme in 1970. The Programme also envisaged to increase the area of land planted with fruit trees and various types of vegetables.148/ Since Israeli occupation of the West Bank began in 1967, Palestinian agriculture has seen no such growth.

Numerous reports have noted the Israeli legal instruments and administrative practices placing restrictions on Palestinian agricultural activities, additional to restrictions on the Palestinian water economy itself. For instance, the 1984 United Nations report by a team of experts states that in accordance with Military Order No. 1015 of 1982, the Commander of the Israeli forces in the West Bank, "in order to preserve the water resources and the agricultural production" has prohibited the planting of fruit trees without a permit from the military government. Trees already planted had to be registered within 90 days and a permit obtained for each of them. Moreover, government inspectors have the power to make searches and to uproot unlicensed trees at the expense of the owners. A subsequent order, reportedly No. 1039 of 1983, contains similar restrictive provisions regarding vegetables.149/ Mr. Ataöv, professor of international relations, found that even though citrus production accounted for one quarter of the GNP in Gaza, and Palestinians there were traditionally farmers irrigating half of the farmland, the military authorities refused permits to plant new citrus trees even to replace damaged ones.150/ In the Gaza Strip it is forbidden to plant new citrus groves without permission by the military authorities, according to an Israeli statement referred to earlier.151/ The aforementioned 1991 ESCWA report states that citrus trees have, in fact, been uprooted and Palestinian farmers have been prevented from planting new citrus trees, both in the Ghor region of the West Bank and in the Gaza Strip.152/ Also, the occupation authorities compel farmers of the Gaza Strip to follow specific agricultural methods in order to prevent the spread of crops that consume large amounts of water, particularly citrus fruits and cotton; further, the area of citrus farming has been reduced substantially during the years of the occupation.153/

In 1981, the total cultivated area in the West Bank was 2,007,000 dunums, of which the total irrigated area was 98,000 dunums, representing some 5 per cent of the total cultivated area.154/ Some 95 per cent of the land cultivated by Palestinians relies for farming largely on rainfall. Such reliance has left an increasing number of Palestinian farmers vulnerable to the vagaries of weather conditions.155/ As discussed, Israel's "cloud

Table 3

Cultivated and irrigated land in the occupied Palestinian territory and Israel, 1988
(1 dunum = 1,000 square metres)

| | WEST BANK | | GAZA STRIP | | ISRAEL |
|---|---|---|---|---|---|
| | Palestinians | Settlers | Palestinians | Settlers | |
| Area of cultivated land (dunums) | 2,100,000 | 55,077 | 214,000 | 11,100 | 4,240,000 |
| Percentage of area | 38 | 1 | 59 | 3 | 21 |
| Area of irrigated land (dunums) | 110,000 | 38,000 | 120,000 | 6,700 | 1,850,000 |
| Percentage of cultivated land | 5 | 69 | 56 | 60 | 44 |

Source: Based on United Nations document A/46/263, annex, table 1, and Benvenisti and Khayat, Atlas, pp. 27 and 113.

seeding" programmes induce rain to fall on its territory, to the north, in the Lake Tiberias region.

Exact figures on the amount of Palestinian land under irrigation before Israeli occupation began in 1967 remain controversial. Experts agree that since then virtually no growth of irrigated Palestinian land has been recorded. According to figures provided by the Israeli West Bank Data Base Project under the guidance of Mr. Benvenisti, in 1985 the size of Palestinian irrigation areas, approximately 104,000 dunums, was basically the same as in 1967, in the region of 6 per cent, receiving between 90 and 100 million cu m of water; in the mid-1980s, the proportion of irrigated areas, some 38,000 dunums, to land cultivated by Israeli settlers was in the region of 69 per cent.156/ A publication of the Gulf Centre for Strategic Studies, London, contains two different sets of information on the extent of irrigation. One set of figures indicates that Israeli policies during the occupation have caused the decrease in irrigated Palestinian land from 322,000 dunums in 1966 to 85,000 dunums by 1986, a decrease of over 73 per cent.157/ Another set of figures, presented in the table below, demonstrates that the area under cultivation, both irrigated and rain-fed, remained relatively constant between 1966 and 1981.158/ Israel, in a statement contained in a United Nations document, maintained that the area under irrigation has expanded by 150 per cent.159/

Regarding irrigation in the Gaza Strip, experts connected with the above-mentioned database project and others state that about 50 per cent, or 108,500 dunams, of the area cultivated by Palestinians is irrigated.160/ According to the same database project, the Israeli settlers in the Gaza Strip irrigate some 6,700 dunams, approximately 60 per cent of the 11,100 dunams cultivated by them.161/

Another area of concern for Palestinian agriculture is any interference with maintaining grazing areas and water supplies needed for animal husbandry. Mr. Gwyn Rowley, the expert of hydrology quoted above on the discussion of the effects of Israeli deep-bore wells on the shallower Palestinian wells in the occupied Palestinian territory, the "leaking aquifers" problem, described some of the consequences of dried out pastures and poor water quality as follows:

Table 4

Area under cultivation in the West Bank
in selected years: 1966-1981
(in thousands of dunums;
1 dunum = 1,000 square metres)

| Cultivated land | 1966 | 1968 | 1973 | 1974 | 1975 | 1976 | 1980 | 1981 |
|---|---|---|---|---|---|---|---|---|
| Irrigated | 100 | 57 | 82 | 81 | 83 | 89 | 92 | 98 |
| Rain-fed | 1,980 | 1,988 | 1,941 | 1,939 | 1,878 | 1,931 | 1,859 | 1,909 |
| Total | 2,080 | 2,045 | 2,023 | 2,020 | 1,961 | 2,020 | 1,951 | 2,007 |

Source: Mohammed K. Shadid, "Israeli policy towards economic development in the West Bank and Gaza", in The Palestinian Economy, George Abed (ed.), (London, Routledge,1988), as shown in Mr. Musallam, "Whose hand on the tap", p. 26.

"The net effect is that carrying capacities and herd sizes are diminished and crop outputs are reduced or fail, and the population has to 'move on', for example, with younger elements seeking employment elsewhere as in urban areas."162/

According to an article published in the March 1991 issue of Tanmiya, a newsletter issued by the Welfare Association, animal husbandry represents 45 per cent of agricultural sector output in the West Bank and 25 per cent of such output in the Gaza Strip. For livestock and its products, official Israeli statistics indicate some 36 and 31 per cent of agricultural output in the respective territories for 1987/88.

In Gaza, after fresh water, fish is a major natural resource directly affected by restrictions on Palestinian water-use rights. According to the above-mentioned February 1991 article in From the Field, restrictions on the use of water resources off the coast of the Gaza Strip have left a negative impact on Palestinian fishery. Along the coast of Gaza, except for a 5 kilometre security zone at the Egyptian-Gazan border, fishermen are allowed to fish 18 kilometres out to sea. Fishermen found outside the permitted boundaries face confiscation of their identification cards, fishing permits and catch. According to the Fisherman's Association, the fishing industry employs about 1,200 fishermen, in addition to many others employed in related activities, such as marketing and producing and repairing fishing implements and boats. Restrictions on fishing have grown steadily since the beginning of Israeli occupation in 1967 and intensified with the outbreak of the uprising in December 1987. During the past three years, the authorities have regularly denied fishermen access to the sea during the two peaks of the sardine season, allowing them less than a week for fishing. Additional losses to the fishing industry were sustained from January to late March 1991, states the article.163/

The overall impact of Israeli water policies on Palestinian agriculture remains as a matter of disagreement among different published sources. An Israeli statement indicates that despite the virtually unchanged water consumption totals for agriculture, the area under irrigation has expanded, as was just mentioned, by 150 per cent and yields have increased 12-fold, owing to the introduction of modern equipment and techniques.164/ Moreover, Israel states that expanded productivity and the opening up of the relatively high-priced Israeli food market (while traditional markets in the Arab countries were only partially disrupted, as they continued to receive produce

over the Jordanian bridges) have led to large increases in agricultural income. Growth in agricultural production since 1967/68 has averaged about 10 per cent a year, compared with 5 per cent a year in Israel, according to the statement.165/ Official Israeli statistics indicate that the output values and income originating in the Palestinian agricultural sector of the West Bank and Gaza Strip, for instance between 1985/86 and 1987/88, have increased.166/

By contrast, Ms. Roy, an expert on Gaza working with Mr. Benvenisti's Data Base Project, found that limitations on water usage have eliminated incentives for economic investment and have forced growing numbers of Palestinian producers out of agriculture. Consequently, these measures have undermined the potential for structural growth of Gaza's economy and the possibility of promoting independent economic activity. In her view, Israeli policies contributed to the steady "destructuring" of the agricultural sector.167/ According to an article by Ms. Cheryl Rubenberg published in the Journal of Arab Affairs, between 1969 and 1985 the agriculture share of the West Bank GDP dropped from 36.4 to 30.2 per cent and the agricultural percentage of the Gaza Strip GDP declined from 28.3 to 17.8 per cent. At the same time, the agricultural labour force as a per cent of total labour force diminished from 46 to 27.4 per cent in the West Bank and from 32 to 18 per cent in Gaza.168/

The Security Council Commission established under resolution 446 (1979) detailed in its report of 25 November 1980 that, according to the information received, the economic activity of a number of Palestinian inhabitants had already been reduced to subsistence level, as the water originally available to them has been turned to the benefit of the Israeli settlers. In some cases, it has been reported that Palestinian villagers have been forced to abandon their desiccated farmlands in order to find an alternative livelihood elsewhere.169/ The ICCP Newsletter No. 35 of the International Coordinating Committee for Non-Governmental Organizations on the Question of Palestine (ICCP), dated 15 June 1991, reports that the destruction by the Israeli authorities of fruit-bearing trees robs many Palestinians of their major source of income.170/ The uprooting of large numbers of trees during the intifadah, addressed below, has aggravated this situation.

In addition to interfering with Palestinian agriculture and fishery, Israel subjects Palestinians to restrictions on construction and development efforts. Ms. Schmida's study "Keys to control - Israel's pursuit of Arab

Water Resources", published by the American Educational Trust, mentions that terracing or other Palestinian land development which might impede the surface flow of water to Israel is forbidden by the military authorities.171/ Further, housing construction, which comprises almost the entire construction sector of the occupied Palestinian territory, as well as construction for industrial and public buildings depend for their related infrastructure, such as water connections and drains, on authorizations by the occupying Power. An article by Mr. Nidal Sabri of Bir Zeit University in the autumn 1991 issue of the Revue d'études palestiniennes identified the constraints placed by Israel on the construction of site-specific infrastructure for buildings as a major obstacle for the development of the Palestinian housing sector. The March 1991 issue of Tanmiya reports that permits must also be obtained before simple rainwater catchments can be constructed. Rainfall is collected in anywhere between 6,000 and 10,000 small household cisterns and in village collection pools. Even primitive collection ponds in village squares are restricted by Israel, supposedly to preserve water and the environment.172/ The General Assembly, over the years, has reiterated its call for the implementation of development projects in the occupied Palestinian territory, including the establishment of a seaport and a citrus plant in the occupied Gaza Strip and a cement plant in the occupied West Bank.173/ So far, the implementation of these projects, involving Palestinian water resources, has not materialized.

B. Repressive measures reducing Palestinians' use of water

The Commission established under Security Council resolution 446 (1979) reported that in the early days of the occupation Israeli authorities, under the claim of security, blew up 140 water pumps installed on the west bank of the River Jordan; as a result of that action, the Palestinian farmers were prevented from pumping water from the river for irrigation, whereas the Israeli settlers in the area were allowed to continue to do so.174/ In connection with the declaration by the occupying Power of "closed security areas" and the seizure of land, discussed above, according to the presentation by Mr. Ahmad Katanani, FAO consultant of the Food and Agriculture Organization of the United Nations (FAO), at the Symposium on the Palestinian Agricultural Sector, held at the FAO in Rome from 9 to 11 October 1991, irrigation canals in Jiftlik were destroyed by the Israeli authorities in the summer of 1979.175/ Mr. Ataöv, professor of international relations, provided an example of trees being uprooted as a

punishment for a suspected attack on an Israeli car. He stated that on 26 January 1981, Israeli forces uprooted orange trees in a grove owned by Gaza municipal council member Dr. Akram Matar. Israeli authorities said that a bomb had been hurled from the groves, situated on the Gaza-Khan Yonunes Road.176/ The ICCP Newsletter No. 35 of 15 June 1991 reports that since 1967, the Israeli authorities have uprooted trees, demolished cisterns, blocked natural springs and destroyed wells.

The 1988-1989 report on human rights violations during the Palestinian uprising, issued by the Israeli League for Human and Civil Rights, contains the following text of a newspaper article published in the Israeli newspaper Hadashot of 19 January 1988, in the second month of the intifadah:

> "In the course of a wave of disturbances in the Gaza Strip, Israeli Defence Forces officers and civil administration officials cut off electricity and water supplies to the homes of thousands of refugee camp residents and disconnected telephone links. This was disclosed yesterday by a senior officer, who is one of the army commanders in charge of the area.
>
> "The officer told Hadashot yesterday that he intended to lodge an official complaint with the chief of staff. He said that during briefings of commanders in the area, an instruction was given to cut off the electricity, interfere with the telephone lines in the refugee camps, and make sure the residents' supply of water was interrupted. The aim was to show the residents who is the real boss in the Strip and to prove to them that we can employ measures they haven't dreamt of.
>
> "The senior commander noted that these measures had met with resentment among some of the officers, who raised reservations in the course of the briefing."177/

According to another published account, on 1 January 1989, the Israeli authorities stopped paying the water bill of the Shufat refugee camp in northern Jerusalem. The official reason for withholding payment was that the camp's water expenses had risen greatly since a network of pipes carrying water to individual homes had been constructed by residents of the camp. Representatives of the camp have refuted such claims. They pointed out that

the latest event was the most recent attempt to move residents out to make way for the expansion of a nearby Israeli settlement housing military personnel.178/ An expert at the Gulf Centre for Strategic Studies reported that he was a witness to the 43-day total curfew of Jelazoun refugee camp during April 1989; although the curfew was reported widely in the local and international press, according to that source no mention was made of the water cuts, which were in addition to power cuts and restrictions on food supplies. Food and water were left after midnight by residents of neighbouring villages in plastic bags hung on branches of trees bordering Jelazoun. The bags were collected by the young men from the refugee camp who dared to leave their homes despite the presence of heavily armed Israeli soldiers. In a separate example given by the expert, in June 1990 Israeli authorities cut water supplies to Jiftlik in the lower Jordan Valley. Jiftlik is surrounded by Israeli agricultural settlements. The Israeli Administration denied at the time using water as a "weapon", although village elders were told that supplies would be restored only in return for a pledge to stop stone-throwing and tire-burning on the road to Jericho.179/

The February 1991 issue of From the Field, indicates that since the beginning of the intifadah in December 1987, over 99,000 trees owned by Palestinian have been uprooted by the occupation authorities. The following table on trees uprooted during the period from December 1987 to April 1991 was provided by the Union of Agricultural Work Committees, Jerusalem, as appendix 3 of a written communication dated 9 June 1991:

The long and extensive curfew, which paralyzed the entire West Bank and Gaza Strip from 16 January 1991 until it was gradually lifted at the end of February/beginning of March 1991, prevented Palestinians from having normal access to water for both domestic and agricultural purposes. The consequences of the curfew bearing on water were devastating for many Palestinian families and agriculture. According to an article in the February 1991 issue of From the Field, the agricultural regions most affected by the extensive curfew were the upper and middle areas of the Jordan Valley. For example, some 2,500 dunums of squash and additional dunums of fava beans were lost because farmers were not able to spray their crops at the appropriate time. Greenhouse agriculture on 10,000 dunums in the Tulkarm region and Gaza was also severely affected. The loss of grazing, brought on by drought conditions and exacerbated by the curfew has caused in one month estimated financial losses of $6 million.180/ The opinion was expressed in an article in News from Within of 6 June 1991 that the Israeli authorities use a

Table 5

Trees uprooted during the period from December 1987 to April 1991

| Month | Number | Month | Number |
|---|---|---|---|
| Dec. 87 | 1,000 | Sep. 89 | 1,875 |
| Jan. 88 | 50 | Oct. 89 | 3,565 |
| Feb. 88 | 200 | Nov. 89 | 835 |
| Mar. 88 | 821 | Dec. 89 | 828 |
| Apr. 88 | 2,384 | Jan. 90 | 1,697 |
| May 88 | 3,748 | Feb. 90 | 4,483 |
| Jun. 88 | 4,005 | Mar. 90 | 3,156 |
| Jul. 88 | 1,733 | Apr. 90 | 1,145 |
| Aug. 88 | 1,832 | May 90 | 2,552 |
| Sep. 88 | 3,212 | Jun. 90 | 5,932 |
| Oct. 88 | 3,365 | Jul. 90 | 2,257 |
| Nov. 88 | 1,090 | Aug. 90 | 1,145 |
| Dec. 88 | 2,594 | Sep. 90 | 5,927 |
| Jan. 89 | 5,253 | Oct. 90 | 2,479 |
| Feb. 89 | 3,097 | Nov. 90 | 7,728 |
| Mar. 89 | 1,405 | Dec. 90 | No info. |
| Apr. 89 | 4,298 | Jan. 91 | 247 |
| May 89 | 5,422 | Feb. 91 | 1,596 |
| Jun. 89 | 3,207 | Mar. 91 | 2,615 |
| Jul. 89 | 2,319 | Apr. 91 | 1,781 |
| Aug. 89 | 2,308 | | |

Source: Based on Palestine Human Rights Information Center (PHRIC), Jerusalem/Chicago, fieldwork and Land Research Committee, Arab Studies Society, Jerusalem, information as reported by the Union of Agricultural Water Committees, Jerusalem, on 9 June 1991, appendix 3.

policy of controlling water supplies to try to make the Palestinian population dependent and submissive - in addition to reducing the water consumption of Palestinians.

## III. THE IMPACT OF ISRAELI POLICIES ON PALESTINIAN WATER CONSUMPTION: INSUFFICIENT AVAILABILITY AND QUALITY OF WATER

As a result of extensive Israeli controls affecting both the Palestinian water economy and any development activities requiring water, the consumption of water by Palestinians is being maintained at approximately the level it was in 1967, drought conditions are becoming increasingly widespread and water quality has deteriorated below acceptable international and Israeli standards in many Palestinian communities, endangering their public health conditions.181/ Catastrophic conditions prevail in the Gaza Strip, likely to lead, according to an article in the Austin American-Statesman of 26 March 1989, to an enormous international human rights controversy: Israel, the occupying Power, might not be able to ensure the provision of water of sufficient quality to Gazans, as required by international law. Many rural areas in the West Bank face a similarly serious situation, as water consumption and quality are maintained often below the essential requirements. Despite these dire conditions, the occupying Power reportedly pumps water from some areas in both the West Bank and the Gaza Strip to Israel, across its international boundaries.

Based on published information detailed below, the consumption of the approximately 850 million cu m annual potential of fresh water resources originating in the occupied Palestinian territory is restricted by Israel, the occupying Power, in such a manner that Palestinians there are permitted to use some 27 per cent, or 230 million cu m, of these resources. Well over two thirds of the water is made available directly or indirectly to consumers in Israel and in the Israeli settlements in the West Bank and Gaza Strip. The Israeli consumption of the transboundary water tables exceeds 95 per cent.

One of the most tangible constraints placed on Palestinians in the implementation of available water legislation is the small number, shallow depth and low yield of wells or boreholes authorized by the occupation authorities for domestic use and virtual absence of new wells for the agricultural use of water by Palestinians. Mr. Schiff, an Israeli defence expert, states that Israel prohibits Palestinians in the West Bank from drilling new wells except for drinking purposes and does not permit any increase from the amount drawn in 1967. Although it safeguards the minimal drawing rights of the Palestinians, as determined by the 1976 Water Census, Israel does not permit the drawing of additional water to meet the needs of the Palestinian

agricultural development in the area. According to Mr. Schiff, there is no doubt, as discussed above, that the Jewish residents currently enjoy much larger quotas than the Palestinians.182/ The June 1991 issue of Tanmiya, a newsletter issued by the Welfare Association, mentions as an example the case of Kiryat Arba above Hebron: the 5,000 settlers receive 5-6,000 cu m of piped water daily, while the 100,000 Palestinians get only 6-7,000 cu m As a result, states the article, some quarters of Hebron have on occasion gone without direct water for one month and even two months at a stretch.183/

Israel indicates that drilling permits are always issued when it is necessary to replace existing wells which became dry. Permits in what Israel calls "Judea and Samaria" were denied only regarding new irrigation wells in over-exploited basins. Drilling of domestic water supply wells was as a general rule permitted.184/ An earlier Israeli statement presented the following description of legal and administrative practices pertaining to wells and boreholes:

> "25. Similar to Israeli law, Jordanian law (which is still in force in Judea-Samaria) requires an official permit to be obtained prior to the digging or boring of a new well. At present, the competent authority of the Israeli administration for this matter is a water staff officer, who examines applications for permits with the assistance of an advisory committee.
>
> "26. In the [10] years of Israeli administration between 1967 and 1979, a total of 80 applications for permits to prospect for water were received from Arab inhabitants. Thirty of these were approved, but not a single new well was sunk by the applicants..."185/

Mr. Dillman, a legal expert, in his 1989 article in the Journal of Palestine Studies stated that, in fact, the Israeli Government has admitted that there is a policy against granting Palestinians permits to drill new agricultural wells. The official explanation for this policy is that increased productivity can take place by improved on-farm irrigation methods rather than by putting more land under irrigation, reports Mr. Dillman. In the same article, the argument is put forward that the higher number of authorized wells cited by the Israeli Government include permits for the improvement of existing wells and that a permit to prospect for water may not include permission to dig and operate a well. Also, given the Israeli restrictions on water use and any

water-related development, in particular planting, it may not be economical to develop a source of water for which a drilling authorization was granted.

In the early 1980s, a United Nations report on the living conditions of the Palestinian people argued that although there is undoubtedly a need to conserve water through controls on its utilization, the fact that the general rate of per capita water consumption in Israel is almost four times that in the West Bank provides justification for the view that the water policies of the occupation authorities deny Palestinians the use of water resources at the same level as Israeli citizens.186/ Official Israeli sources give somewhat different proportions and figures and provide their explanation for the reported consumption differential. According to the 1990 Director-General's report to the International Labour Conference, at the Israel Ministry of Defence, the Deputy Coordinator for the administration of the occupied territories informed the Director-General's representatives that in 1989 the water consumption of settlers in the Gaza Strip, compared with that of the Palestinians was only 2 per cent of the total consumption, or approximately 2 million cu m of water. In the West Bank, the proportion is approximately 15 per cent. It was nevertheless recognized, continues the report, that in actual fact a Palestinian of the West Bank or the Gaza Strip consumes between 35 and 45 cu m per year for domestic use, while a Jewish inhabitant of a settlement in these territories consumes between 85 and 90 cu m per year for the same purpose. These latter figures were explained as corresponding to normal Israeli consumption; if it was nearly double that of Palestinian consumption, it was said to be due to the difference in standard of living. However, the Palestinian inhabitants of the occupied territory complain that they are often short of water, which is frequently cut off. The authorities of the Ministry of Defence rejoined that a decision had been taken three years earlier to lower total water consumption by 10 per cent for all the inhabitants of the region.187/

West Bank water consumption

Restrictions on the Palestinian use of the annual groundwater resources of the West Bank, approximately 600 million cu m, led in the 1980s to the annual availability of some 120 million cu m for Palestinians and almost 500 million cu m for use in Israel and its settlements in the West Bank.188/ In the mid-1980s, some 750,000 Palestinians in the West Bank had to make do with the annual allocation of approximately 120 million

cu m, while some 21,000 Israeli settlers received approximately 45 million cu m, or almost one third of the total 165 million cu m local groundwater estimated as being consumed per year in the West Bank. A stark imbalance in water consumption, at times with privileges for settlers at an annual rate of approximately 2,143 to 139 cu m per capita consumed by Palestinians, was maintained throughout the 1980s.189/

The figures given in a recent report issued by the United Nations Conference on Trade and Development (UNCTAD) reveal that some 460 of the 720 Palestinian wells in existence prior to 1967 have been destroyed, have dried up or have been expropriated.190/ Information published by Mr. Benvenisti's West Bank Data Base Project indicates that, in the early 1980s, West Bank Palestinian water sources included between 230 and 330 relatively shallow boreholes, supplying approximately 55-80 million cu m; 300 springs supplying some 50-60 million cu m, and rainfall reservoirs and cisterns supplying about 5 million cu m per year; as mentioned above, some 9-10 million cu m are taken annually from the Jordan River.191/

According to the Benvenisti report, the situation was particularly grave in the western and north-eastern water-tables of the West Bank, as Israel uses approximately 500 million cu m originating there and Palestinians in these areas only 20 million cu m Mr. Benvenisti has calculated that according to estimates, Israel is overpumping within its borders these two main transboundary water tables, each to its ecological limit, in a ratio of 4.5 per cent to the West Bank and 95.5 per cent to Israel. Through restricting water consumption in the Palestinian highlands, Israel receives downhill some 25 to 35 per cent of its annual water resources and maintains the pressure of the aquifer systems within its borders.192/

Regarding the eastern water-tables of the West Bank, Mr. Benvenisti details the annual average consumption of the approximately 125 million cu m of water found there as follows. Some 80 million cu m are used by the Palestinians, including 20 million cu m on the mountain plateau and about 50-60 million cu m in the Jordan Valley and its eastern slope. Some 30 million cu m from the same water tables are used by the Israeli agricultural settlements in the Jordan Valley, part of whose total consumption is supplied by sources outside the region. There is a water surplus in the eastern tables, but the authorities have not permitted the Palestinians of the West Bank to expand the utilization of their water sources.193/

Table 6

Estimates of the total and per capita annual water consumption in the occupied Palestinian territory and Israel, mid-1980s

| | WEST BANK | | GAZA STRIP | | ISRAEL |
|---|---|---|---|---|---|
| | Palestinians | Settlers | Palestinians | Settlers | |
| TOTAL ANNUAL WATER CONSUMPTION (million cu m) | 125 | 45 | 103 | 6 | 1,770 |
| Irrigation | 95 | | 80 | | 1,320 |
| Households | 27 | | 21 | | 325 |
| Industry | 3 | | 2 | | 125 |
| PER CAPITA ANNUAL WATER CONSUMPTION (cu m) | 139 | 2,143 | 172 | 2,326 | 411 |
| Irrigation | 106 | | 133 | | 307 |
| Households | 30 | 85 | 35 | 85 | 75 |
| Industry | 3 | | 3 | | 29 |

Source: United Nations document A/46/263, annex, table 1, Benvenisti and Khayat, p. 26; and Roy, 1987, p. 69; and ILO, Director General's Report, 1990, vol. 2, pp. 38-39.

According to an Israeli Ministry of Defence booklet, water consumption for domestic use in 1966 was estimated at only 5 cu m per capita per annum, mainly due to the severe shortage of water supply installations. In 1984, rural water consumption reached 25 cu m per capita per annum, and 75 cu m per capita in the urban sector, stated that source.194/ Mr. Benvenisti and Mr. Khayat indicate that, although piped water has been provided to 90 per cent of the population of the cities and, in the small towns and villages, some 60 per cent of the residents receive water, the quantity of water available annually to Palestinian residents is only about 20 per cent higher than it was in 1967 and the water available for agriculture was frozen at the 1967 level, approximately 90-100 million cu m.195/ However, and as mentioned earlier, Mr. Schiff, an Israeli expert, found no increase even in the domestic consumption of Palestinians. According to information provided by the Palestine Liberation Organization Economic Department, in 1990, 150 of the approximately 400 villages in the West Bank received no drinking water through a water network and, according to Mr. Benvenisti's data, in 1982, the per capita domestic consumption of water of Palestinians living in rural areas was a meagre 15 cu m.196/

Gaza Strip water consumption

According to an article by Mr. Harmlani in the Journal of Palestinian Affairs, it seems that the basic concept of the water policy of the occupation authorities in Gaza has been exemplified by pressure to bring consumption rates among Palestinians to the lowest possible levels in order to guarantee water stability in the coastal plain of what he termed "central Palestine", whose groundwater is connected to the aquifer that supplies the Gaza Strip, and also in order to meet the water requirements of the Jewish settlements established in the Gaza Strip since 1967.197/ In addition to other restrictions, water is being allocated to farmers in the Gaza Strip on the basis of soil conditions and the specific crop cultivated. According to Mr. Benvenisti and Mr. Khayat, the allocations for crops are as follows: citrus - 1,000 cu m/dunum/year, vegetables - 700 cu m/dunum/year, strawberries - 1,000 cu m/dunum/year and olives/almonds - 300 cu m/dunum/year.198/ Ms. Roy, a Gaza expert associated with Mr. Benvenisti's Data Base Project, reports that the restrictions based on soil conditions included the following: water for plants on hard soil is limited to 800 cu m/dunum/year and to 1,000 cu m/dunum/year for those on sandy soil.199/ As discussed above, there are reports that diversion projects pump Gaza water to Israel in one or two areas.

Apart from the consensus that the water situation in Gaza is particularly acute,200/ quantitative information on water consumption in the Gaza Strip is incomplete, including information stemming from Israeli sources. The aggregate annual water consumption in the Gaza Strip during the early 1980s was estimated by Mr. Benvenisti and Mr. Khayat, Israeli experts, to be in the region of 130 million cu m, exceeding the natural replenishment by about 60 million cu m.201/ Israeli Ministry of Defence figures indicate, for approximately the same period, a consumption of some 90 million cu m per year, exceeding the renewable water resources by an estimated 30 million cu m per year.202/ The aforementioned recent UNCTAD study found that the water extracted from some 1,700 Palestinian artesian wells on the coast, some 105 million cu m annually, as reflected in the preceding table, has exceeded the natural recharge at an annual rate of approximately 30 million cu m.203/

The information regarding the number of boreholes and other access permitting water consumption in the Gaza Strip is similarly inconclusive. In contrast to the above-mentioned count of 1,700 wells, also reflected in a statement by Israel,204/ Ms. Roy reports for 1986 an estimated 2,200 boreholes, with 1,800 located in the inner Gaza area and some 350 by the sea, and Mr. Schwarz, an Israeli water expert, indicates a count of merely 1,600 wells.205/

Figures on the consumption of water by Israeli settlers in the Gaza Strip remain controversial. Revising downward substantially her earlier data, in 1987 Ms. Roy stated that, according to the Israel Water Commission, in 1985 some 2,200 Israelis living in the Gaza Strip consumed per capita 2,326 cu m of water compared to an average consumption of 123 cu m for every one of the approximately 500,000 Palestinians living there.206/ According to information provided by staff of the Israeli Deputy Coordinator of Government Operations in what Israel calls the "administered areas", and confirmed by Mr. Zvi Grunwald of the Israel Water Commission, as published in an article of the Jerusalem Post of 5 September 1986, Israeli settlers used in the preceding year between 5-6 million cu m of water in the Gaza Strip. In a statement contained in a United Nations document, Israel mentions that in 1983-1984, Israelis in the Gaza Strip used about 1.4 million cu m from local sources, suggesting a per capita consumption of approximately 680 cu m per year. The statement continued that the irrigated lands of Israeli farms are supplied from the Israel National Carrier and not from local groundwater.207/ Moreover, a booklet by the Israel Ministry of Defence states that "... in the Gaza Strip, all towns and villages were

linked to the National Water Network during the first few years of Israeli administration."208/

Information on the consumption of water in the Gaza Strip may become more accurate when the origin and distination of the water there can be determined with less difficulty than is the case at present. Although the official Israeli statements mentioned above referred to an external Israeli source of water for Israeli settlements and "all towns and villages", it should be noted that an only slightly earlier statement by Israel indicated that the 1,776 wells in operation in the area are the only source of water.209/ This view was also reflected in the early 1980s by Mr. Schwarz, an Israeli expert, who stated that the entire 100 million cu m of water consumed in the Gaza Strip was pumped from wells there,210/ and by the Israel State Comptroller's Office which indicated in its report on government operations issued in 1987 that the aquifer of the Gaza Strip supplied at the time all of the area's water needs.211/ Mr. Schiff, an Israeli defence expert, states that, only in 1988, the Israeli Government decided to lay a special water pipeline supplying the Jewish settlements (in the Katif bloc).212/ According to Mr. Anthony Lewis, writing in The New York Times of 30 January 1992, settlements have running water 24 hours a day, unlike most of the Gaza Strip.

Water quality and public health crisis

The need to address urgently the deteriorating water quality in the Gaza Strip and in affected parts of the West Bank has been recognized in many international, Israeli and Palestinian publications. For instance, according to the aforementioned 1991 ESCWA report on Israeli land and water policies, over-exploitation of groundwater in the Gaza Strip and the great increase in water consumption by the Israeli settlements have resulted in rising levels of chlorine, nitrogen, fluoride and salinity, partly through the intrusion of polluted seawater from the Mediterranean. Some 15 to 20 million cu m of groundwater are annually depleted, and approximately 50 per cent of the wells in the Gaza Strip have become unfit for human use and most of them are unfit for irrigation owing to the high salinity levels.213/ An official Israeli statement of 1984 indicates that water abstraction (mostly for irrigation) amounted to 110 million cu m per year compared with an available safe yield of only 50 million cu m per year.214/

Mr. Benvenisti and Mr. Khayat, Israeli experts, report that the over-exploitation of the water resources of the Gaza Strip has led annually to a drop in the water table by an average of 15-20 cm. Sea water seepage has already infiltrated some 1.5 kilometres into the fresh groundwater aquifer. The deterioration in the quality of water has a damaging effect on agricultural production, in particular citrus cultivation. Ms. Roy, working in the context of Mr. Benvenisti's Data Base Project, stated in the mid-1980s that the inner Gaza wells were between 25 and 90 metres deep, with a poor water quality of 250-1,000 milligrams (mg) of chlorine per litre. The wells in the vicinity of the sea were of good quality water, ranging between 20 and 80 mg of chlorine per litre and sunk to a depth of 4-20 metres.215/ According to Mr. Schwarz, an Israeli water expert writing in the early 1980s, the source of the salinity of groundwater in the Gaza Strip is primarily the groundwater entering from the east. In the region opposite the town of Gaza and south of it, inflow salinity ranges in most places from 600 to 1,300 parts per million chloride. In a small section north of "Nahal Besor", inflow salinity exceeds 2,000 parts per million chloride.216/

The drinking water crisis in Gaza was illustrated in a 1990 paper by the Economic Department of the Palestine Liberation Organization with regard to the situation in refugee camps. According to the paper, in his book Al-Istitan - al-Tatbiq al-Amali lil-Sahyuniyah (Settlement - The Practical Implementation of Zionism), Mr. Abd al-Rahman Arafah has stated that 39 per cent of all camp residents in the Gaza Strip have no water in their homes and that in Gaza City 11 per cent of Palestinian homes have no water. The paper continues that the Israeli daily Yediot Aharonot has reported that 17,000 residents of the Bureij Palestine refugee camp in the Gaza Strip have water only for a period of one half hour a day and are obliged to walk daily to a well 1 kilometre from the camp in order to obtain drinking water. The Nuseirat camp, which has about 24,000 residents, suffers from a similar problem.217/

The principal cause of the low water quality in the West Bank, as reported by Israeli and other sources, is the increasing over-exploitation in Israel of the transboundary groundwater resources beneath the West Bank and Israel.218/ As mentioned above, Mr. Benvenisti has found that Palestinians are permitted to use only some 5 per cent of these water resources. According to the testimony given by Mr. Thomas Naff on 25 June 1990 before the House Committee on Foreign Affairs of the United States Congress, Subcommittee on Europe and the Middle East, referred to above, water resources of the occupied territories are being over-exploited annually

by about 150 million cu m and, reportedly, Israeli settlers have also directly contributed to the increasing salinity of the West Bank's water resources.219/ Mr. Benvenisti and Mr. Khayat stated that the over-exploitation by users in Israel of the western and north-eastern aquifers shared with the West Bank results in a drop of these water tables at a rate of approximately 1 foot per year. As the water pressure in Palestinian wells and springs decreases, salinity and pollution increase. Over-pumping in Israel impairs the water quality of Palestinian resources and threatens to destroy the West Bank fresh water resources forever.220/ Regarding the water quality of the Jordan River, Israel has tried to reduce the increasing salinity of Lake Tiberias, origin of the Israel National Water Carrier, by capping or diverting salt springs which empty into the lake. After boring under the lake, salt water is being pumped out and channelled into the lower Jordan River. These projects, established in the early 1960s well before Israel seized control of the West Bank, have significantly reduced the quality of Jordan water flowing on to the West Bank.221/

According to the report of 25 November 1980 of the Security Council Commission established under resolution 446 (1979), efforts by Palestinian farmers to undertake water development projects to improve availability and quality of water were said to have been systematically discouraged by the occupation authorities. For instance, a major development project aiming at the conservation of water resources in the Jiftlik-Wadi Fara'ah area of the West Bank has been rejected by the occupying Power.222/ By contrast, new hydrological surveys have been undertaken by the Israeli settlement authorities in cooperation with Mekorot to meet the water needs of the Israeli agricultural settlements.223/ As a result, Palestinian farmers are forced to reuse meticulously the available water resources, which apparently is a major factor contributing to the deteriorating soil quality, owing to alkalinization.224/

The low quality and quantity of water resources available to the Palestinian population have a direct bearing on the public health situation in the occupied territory. According to the 1990 report of the United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA) to the General Assembly, the supply of potable water in the occupied Palestinian territory continues to be a serious problem, in particular in the Gaza Strip. The over-pumping of water in Gaza by Palestinians and by Israelis across the border in Israel, the additional burden stemming from Israeli settlers in the Gaza Strip and an insufficient amount of water supplied by Israel, the occupying Power, have led to a growing emergency situation in

the public health sector. According to Mr. Benvenisti and Mr. Khayat, the annual total potable water in the Gaza Strip is 19.8 million cu m, while demand for domestic water amounts to 22.2 million cu m Poor water quality has led to an acute shortage of drinking water in some areas and, per year, some 2.4 million cu m of salty brackish water is being used in the Gaza Strip as drinking water, endangering the public health of Palestinians.225/ Findings by an Israeli State Comptroller report, as published in the Jerusalem Post of 2 July 1987, indicate that the West Bank drinking water was substandard in 10 per cent of the tests carried out by the Israeli Ministry of Health in fiscal year 1985.

Numerous accounts address the unequal treatment of Palestinians and Israeli settlers by the authorities in the development of the public health sector. For instance, an article in the Austin American-Statesman of 26 March 1989 reports the following example: In villages near the West Bank city of Jericho, Palestinians get their water from open canals, while nearby Jewish settlements receive theirs through pipes. "The people there have applied to the Israeli authorities tens of times in order to build their own pipe or covered system, but they have been rejected all the time," says a Palestinian physician quoted in the article. He said that contaminated water in the canal has led to widespread illness in the villages, especially among children. Officials of the Civil Administration, the Israel Ministry of Defense organization that administers the occupied territories, declined to comment on why the Palestinian water supply is not also protected.226/

## IV. THE LACK OF INTERNATIONAL PROTECTION OF PALESTINIAN WATER RESOURCES

The basis for the international protection of water resources involving the Palestinian territory occupied since 1967 may be derived from: the confluence of the law of military occupation, such as the Geneva Convention relative to the Protection of Civilian Persons in Time of War, of 1949, referred to as the Fourth Geneva Convention, and the principle of permanent sovereignty of peoples over natural resources reflected in United Nations resolutions, in particular General Assembly resolution 1803 (XVII) of December 1962. Also, specific obligations arise from the International Covenant on Economic, Social and Cultural Rights, adopted by the General Assembly on 16 December 1966 and ratified by Israel. Article 1 of the Covenant reads in part as follows:

> "1. All peoples have the right of self-determination. By virtue of that right they freely determine their political status and freely pursue their economic, social and cultural development.
>
> "2. All peoples may, for their own ends, freely dispose of their natural wealth and resources... In no case may a people be deprived of its own means of subsistence.
>
> "3. The States Parties to the present Covenant, including those having responsibility for the administration of Non-Self-Governing and Trust Territories, shall promote the realization of self-determination, and shall respect that right, in conformity with the provisions of the Charter of the United Nations."

Despite available legal protection and growing expressions of concern, the international community has not so far found appropriate measures for the protection of the Palestinian water resources.

The Fourth Geneva Convention, to which Israel is a high contracting party, is considered by both the Security Council and General Assembly as being applicable to the occupied Palestinian territory, including Jerusalem. The Convention requires an occupying Power to take full responsibility for meeting the needs of the civilian population. Obligations by the occupying

Power in the area of water resources are reported to relate to a number of articles of the Convention. For instance, the Fourth Geneva Convention stipulates in article 53 that any destruction by the occupying Power of property is generally prohibited. Article 55, on food and medical supplies, states that the occupying Power shall make arrangements to ensure that fair value is paid for any requisitioned goods and article 56 refers to the duty of the occupying Power of ensuring and maintaining medical services and public health.

A detailed study by a legal expert of the implications, under international law, of the United Nations resolutions on permanent sovereignty over natural resources, on the occupied Palestinian and other Arab territories and on the obligations of Israel concerning its conduct in these territories, annexed to a report of the Secretary-General dated 21 June 1983, includes for consideration the following aspects relevant for the legal protection of Palestinian water resources under international law:

(a) The primary right of peoples and nations to permanent sovereignty over their natural resources is a right freely to use, control and dispose of such resources;

(b) A second implication derived directly from the primary right would be that in any interim pending full implementation of the foregoing, control over land, water and other natural resources should be restored to the local population;

(c) A third implication would be that the occupying Power is under an obligation not to interfere with the exercise of permanent sovereignty by the local population;

(d) A fourth implication of the United Nations resolutions on permanent sovereignty over natural resources would be the strengthening of the protection of the natural resources of the occupied territories afforded by the law of belligerent occupation;

(e) A fifth implication of permanent sovereignty would be to reinforce a right under international law to reparation for any loss or damage to natural resources suffered as a result of violations of the rules of belligerent occupation.227/

According to an expert at the Gulf Centre for Strategic Studies, critics of the Israeli occupation could argue that years of Israeli exploitation of West Bank water have left the area's fragile water system in a deteriorated state, with the water-tables at an all-time low, an increasing poor quality of water, the drying up of existing wells and the diversion of the River Jordan upstream.228/ If such a case can be proven, and according to that author the evidence suggests it can, then Israel would be in breach of article 53 of the Fourth Geneva Convention. Mr. Dillman, a legal expert, submits that Israeli practices resulting in the increased and possible permanent salinization of underground aquifers is clearly a destruction of property within the meaning of article 53.229/ Mr. Ataõv, professor of international relations, interpreted the findings of the report dated 25 November 1980 of the Security Council Commission established under resolution 446 (1979) as indicating that Israel's use of West Bank water is a "clear and gross violation of the Fourth Geneva Convention."230/

The report of 25 November 1980 of the Security Council Commission established under resolution 446 (1979), focusing on natural resources, particularly water resources, found the following:

> "238. Available evidence shows that Israeli occupying authorities continue to deplete the natural resources, particularly water resources in the occupied territories for their advantage and to the detriment of the Palestinian people.
>
> "239. As water is a scarce and precious commodity in the area, its control and apportionment means control of the most vital means of survival. It would seem, therefore, that Israel employs water both as an economic and even political weapon to further its policy of settlements. Consequently, the economy and agriculture of the Arab population are adversely affected by the exploitation of water resources by the occupying authorities."

The Commission report recommended that in view of the vital importance of water resources for the prosperity of the occupied territories and of the serious depletion of those resources as a result of their intensive exploitation by the Israeli authorities, mainly for the benefit of the Israeli settlements, appropriate measures should be sought for an equitable allocation of water resources in the area outside of any political considerations. Although the Security Council,

in a preambular paragraph of its resolution 465 (1980) of 1 March 1980, had taken into account the need to consider measures for the impartial protection of private and public land and property, and water resources, the Council has yet to address the Commission's report and the protective measures in need of consideration.

Meanwhile, the international community continued to express its long-standing concern regarding the permanent sovereignty over natural resources in the occupied Palestinian and other Arab territories which, in the past, had been reflected for instance in General Assembly resolutions 3005 (XXVII) of 15 December 1972, 3336 (XXIX) of 17 December 1974 and 32/161 of 19 December 1977. The United Nations Water Conference held in Mar del Plata in 1977, in its resolution X entitled "Water policies in the occupied territories" referring explicitly to Palestine, affirmed the inalienable right of the people of the countries under colonial and alien domination in their struggle to regain effective control over their natural resources, including water resources. In resolution 37/135 of 17 December 1982, the General Assembly emphasized specifically the right of the Palestinian and other Arab peoples whose territories are under Israeli occupation to full and effective permanent sovereignty and control over their natural and all other resources, wealth and economic activities. In its resolution 38/144 of 19 December 1983, the General Assembly condemned Israel for its exploitation of the natural resources of the occupied territories, including Jerusalem, and reaffirmed the right of the Palestinian people to restitution and full compensation for the exploitation, depletion, loss of or damage to its resources. Throughout the 1980s and beyond, the General Assembly has "strongly condemned the illegal exploitation of the natural wealth and resources" of the occupied territories and called upon Israel to desist immediately from such activities.231/

## V. WATER SECURITY AND TECHNICAL COOPERATION PLANS

In the context of the Arab-Israeli conflict and the question of Palestine, water resources and installations have been repeatedly a cause and target of armed conflict and could serve in the future as a possible catalyst for regional cooperation and peace.232/ Since the late 1970s, water plans of unprecedented dimensions, involving the water resources of the occupied Palestinian territory, have been conceived to tackle the growing needs of the countries and peoples in the region.

According to an article in the Financial Times, experts predict that in the 1990s, water will constitute a source of intense political rivalry between nations of the region and a key obstacle to the resolution of the Arab-Israeli conflict. On the West Bank, water is a subject of almost constant dispute among Palestinians, the Israeli occupation authorities and Israeli settlers, who are frequently accused of over-pumping.233/ Mr. Mudar Badran, Prime Minister of Jordan, was quoted in the Jerusalem Post of 3 July 1990 as saying that the use of groundwater resources for settlements means turning the page on peace forever and ever.

According to Mr. Ataöv, professor of international relations, Israel wants to continue its control of Palestinian water resources both because of the danger to water reserves inside the Green Line and because it will not be possible to establish new settlements without such supervision. After returning from the Camp David talks in the fall of 1978, Israeli Prime Minister Mr. Menachem Begin had appointed a committee to formulate Israeli positions in this respect. Reportedly, the committee received a memorandum from the Israeli Water Commission stating that both Israeli water needs and the establishment of new settlements in the occupied areas depended on continuing Israeli control over the water resources in any "autonomy" scheme for the West Bank. The Israeli Cabinet was likewise advised that Israel ought to have the final say in the use of these waters in any kind of political arrangement.234/ More than 10 years later, on 16 September 1990, Mr. Rafael Eitan, Minister of Agriculture, reportedly argued in an Israeli Cabinet session that "giving up control of the State of Israel's main water sources in Judea and Samaria is absolutely out of the question".235/ According to the Minister, Israel's continued control of West Bank water sources "is necessitated by reality" and the Government would be well advised to launch a public relations campaign, both in Israel and overseas, "to hammer this principle into public consciousness",236/ stated the Israeli newspaper

Ma'ariv the following day. The Washington Post reported on 15 December 1990 that Mr. Yitzhak Shamir, Prime Minister of Israel, had the previous day proposed regional talks on water sharing. Speaking on Israeli television on his return from talks with President Bush in Washington, Mr. Shamir said, "I would like to add to the agenda of the peace talks today a discussion of regional ideas ... to start with regional problems that are important to all countries in the region, like the water problem". The Palestinian dimensions of such discussions were not addressed.

According to a paper prepared by the Economic Department of the Palestine Liberation Organization and presented at the forty-fifth session of the Conference of Officials in Charge of Palestinian Affairs in the Arab Host Countries, held at Damascus from 21 to 27 July 1990, the question arises of how Israel will provide itself with sufficient sources of water to achieve its expansionist plans for a greater Israel. In the view of the PLO, continues the paper, it is self-evident that this strategic question will be the focus of the concerns of Arab experts and technicians and of Arab leaders. The struggle for Arab water sources will be a major cause of future wars between the Arabs and Israel. For the Arabs, national security is closely linked to food security and the latter is linked to water security, particularly in the light of the fact that experts predict an Arab water shortage by the end of the century. According to the paper, mass Jewish immigration from the Soviet Union will reveal Israel's ambitions with regard to Arab sources of water, as the three factors - immigration, the confiscation and occupation of new land for colonialist settlement activities and the appropriation of Arab sources of water - are connected.

Historically, water resources were a contested issue in the determination of the boundaries of Palestine and the Jewish home there. In 1919, two years after the Balfour Declaration, Chaim Weizmann wrote to British Prime Minister David Lloyd George the following, as stated in an article by Mr. Dillman:

> "...The whole economic future of Palestine is dependent upon its water supply for irrigation and for electric power, and the water supply must mainly be derived from the slopes of Mount Hermon, from the headwaters of the Jordan and from the Litani river ... [W]e consider it essential that the northern frontier of Palestine should include the valley of the Litani, for a distance of about 25

miles above the bend, and the western and southern slopes of Mount Hermon..."237/

Following the article published by Mr. Ewan Anderson in Arab Affairs mentioned earlier, since 1951, with the draining of the Huleh Marshes north of Lake Tiberias, in the demilitarized zone, there have been clashes, either with water resources as an excuse for conflict or definitely water-related. Up to 1967, there were 11 such incidents documented. Major points of contention included the proposed diversion of the Jordan, well above Lake Tiberias, into the Israeli National Water Carrier. This was opposed by the Syrian Arab Republic, the United States and the United Nations and work, which had commenced in 1953, was halted. Instead, water is taken from Lake Tiberias. The most serious potential source of conflict occurred following an Arab summit meeting in 1964 at which the proposal to divert the headwaters of the Jordan was discussed. Various possibilities were mooted and work began in 1965. Israel responded strongly and, following a number of incidents, tension built up to the 1967 war. Since 1967, the territorial picture has changed considerably. The area remains tense and, with the deteriorating water situation, tension is likely to mount, stated the 1988 article in Arab Affairs.238/

Recent water resource development plans affecting Palestinian rights have been discussed for various areas of the region and included the following.239/ According to The Christian Science Monitor of 16 March 1990, one technically feasible proposal is a canal that would link the Yarmuk River, which forms the border between the Syrian Arab Republic and Jordan and between Jordan and Israel, with Lake Tiberias in Israel. During the winter months, the canal would funnel rainwater, that would otherwise be lost, downstream into the lake. Some of this water could then be used to replenish underground reserves in Israel and the occupied West Bank. During the dry summer months, water could be pumped back through the Yarmuk into the 42-mile long Ghor Canal that irrigates the Jordanian side of the Jordan River.240/ An official Israeli statement suggested that an amount of approximately 100 million cu m per year of Jordan River water could be put to use by constructing additional impoundments to those upstream on the lower Jordan River, despite the technological difficulties and high costs involved.241/

Another major proposal, put forward by former Egyptian President Anwar Sadat at the time of the Camp David negotiations, relates to the diversion of Nile water across the Sinai Peninsula into the Gaza Strip. In

1979, President Sadat, as part of the normalization of relations between the two countries, indicated the possibility of selling water to Israel. Water from the Nile, which supplies Egypt with 55 billion cu m per year, 15 times the entire potential water supplies of Israel, the West Bank and Gaza, Jordan and Lebanon combined, would be pumped to Israel, where it would join an expanded national water carrier system for distribution to the various end users.242/ According to Mr. Schiff, an Israeli defence analyst, water could be channelled from the Nile to Gaza in the context of an Egyptian plan to bring Nile water to the Sinai coastal city of el-Arish, which borders the southern end of the Gaza Strip.243/ Following information contained in Ms. Starr's article in Foreign Policy of April 1991, the Kuwait Fund for Arab Economic Development and other financial institutions had expressed intentions in July 1990 to underwrite Egypt's North Sinai agriculture project estimated at more than $1.3 billion. The project was designed by the Food and Agriculture Organization of the United Nations to expand Egyptian settlement in the Sinai and increase agricultural production.244/

Water could also be brought to the West Bank and Gaza Strip from the north as far as Turkey. According to the Jerusalem Post of 24 March 1991, under a Turkish proposal, two pipelines would carry water to eight countries from the Seyhan and Ceyhan Rivers. The network's western branch would supply the Syrian Arab Republic, Jordan and Saudi Arabia along a 2,654-kilometre route. A 3,861-kilometre pipeline would cross Saudi Arabia to Kuwait, Bahrain, Qatar, the United Arab Emirates and Oman. About 30 million people in the region could benefit. As first conceived, the network would have included the Gaza Strip and West Bank. Mr. Turgut Ozal, President of Turkey, who had introduced the project in 1987, wrote recently in ABC, a Spanish daily, that "...to establish enduring peace in the region, it is necessary to begin a process focused on economic interdependence among the Middle East nations".245/

Mr. George E. Gruen, adjunct professor of international relations at Columbia University, summarized findings of a March 1986 study by Mr. Elisha Kally, formerly of Tahal Consulting Engineers Ltd., a subsidiary of Tahal-Water Planning for Israel, entitled "A Middle East Water Plan Under Peace", in his written submission to a Hearing before the Subcommittee on Europe and the Middle East of the United States Congress in 1990.246/ The West Bank and the Gaza Strip differ, according to Mr. Gruen's summary of the study, from other areas in the Middle East because both of these regions are dependent, although to a different extent, on outside sources of water. The Nile River would be the best choice of extra water for the Gaza

Strip, while the West Bank needs could best be met by using the Yarmuk and Litani Rivers, with Lake Tiberias as the collection site of imported waters. Two complementary systems could be used to supply the western part of the West Bank with water, continues Mr. Gruen's account. The eastern part of the West Bank would receive water from a separate system that would begin at Lake Tiberias and head southward. This system would supply the Jordan Valley and then transfer the water westward to supply the eastern slopes in the central mountain range of the West Bank.247/ Mr. Mitchel Levitas reported in The New York Times of 29 January 1992 another plan involving the Palestinian West Bank. The proposal is to dig a tunnel-and-canal water carrier from the Mediterranean just south of Haifa to a desalination plant at Bet She'an Lake about 40 miles east. There, an 800-foot drop in the water level would supply most of the energy needed to purify the water and make the cost, an estimated 45 cents a cubic metre, practical. About a third of the desalinated water would be pumped a few miles north to the Sea of Galilee, serving as a huge reservoir of fresh water for irrigation in Jordan and Israel. A pipeline could even carry water to Damascus, 100 miles away. According to the report, the untreated water would be channeled into the Jordan River, now mightily renewed, and carried to the Dead Sea, restoring the ecological balance of the Jordan Valley.

Regarding any possible future arrangements, Ms. Starr argued in her April 1991 article in Foreign Policy that without a comprehensive water-sharing agreement or understanding between Israel, the West Bank, Jordan and the Syrian Arab Republic on the one hand, and Israel and the Gaza Strip on the other, there can be no policy "road map" to a just allocation scheme.248/

According to Mr. Schiff, the aforementioned Israeli defence analyst, the question of West Bank and Gaza water resources poses especially complex and difficult security problems. Water has no boundaries. Subterranean flows, reservoirs and aquifers cannot be dealt with in the same way as geographic landmarks or artificial border demarcations. Drilling, in particular on the western part of the West Bank, could have a direct effect on the water balance of Israel's most populated area and could result in the salinization of the reservoir that supplies water to the coastal plain. An identical water problem exists in the Gaza Strip, although the roles of the players are reversed. There, overdrawing of water by Israel could affect Gaza's overall water level and lead to its salinization.249/ Regarding the Gaza Strip, mutual dependence on water resources poses a greater danger to Palestinians than Israelis, according to Mr. Schiff. Israel is the party sitting "up-river"

and excessive drawing on the Israeli side could affect the quantity of water available to residents of the strip. Gaza already suffers from overdrawing and the salinization of its water has increased considerably.250/

Mr. Schiff argues that any Israeli-Palestinian peace agreement would require cooperation between the two parties on sharing water resources. Palestinians would certainly demand a greater quantity of water from the Yarkon-Tanimin groundwater reservoir below the West Bank and Israel. This is a demand Israel cannot disregard if it hopes to build close cooperation with the Palestinian entity in order to prevent uncontrolled drilling. The author continues that one way to safeguard Israeli water security is to establish a joint Israeli-Palestinian water committee. Such a committee would supervise water resources, establish quotas and oversee the distribution of water in accordance with internationally accepted criteria. Israel must also insist that, even if a Palestinian entity is established, the committee would continue to function.251/

Mr. Baskin, the Israeli director of the Israel-Palestine Center for Research and Information, concluded in a 1990 article that bilateral deliberations in the region, such as those between Israel and Jordan, Jordan and the Syrian Arab Republic and the Syrian Arab Republic and Turkey, completely fail to address the Palestinian question. The Palestinian State's lack of formal structures makes it a non-entity in the framework of international negotiations. This is an unfortunate, short-sighted and dangerous result because these negotiations could shape the future of water use in the Middle East. Failure to take the Palestinians into account as a separate and sovereign entity will lay the groundwork for further conflict.252/

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## Notes

Symbols of United Nations documents are composed of capital letters combined with figures. Mention of such a symbol indicates a reference to a United Nations document.

(For full reference, see bibliography below.)

1/ See A/39/233, para. 52.

2/ See West Bank Data Base Project, and the Jerusalem Post of 28 May 1990.

3/ See A/39/326.

4/ The Jerusalem Post of 21 August 1990.

5/ Starr, 1991, p. 26.

6/ See special report, "Sovereignty over water resources".

7/ See Security Council Commission report, S/14268, para. 234; Musallam, 1990 p. 10; Dillman p. 48.

8/ S/14268, para. 234.

9/ See, for instance, Musallam 1990, p. 17; Afro-Asian Solidarity, Nos. 3-4, 1990; and section IV below.

10/ A/C.2/39/7, p. 19.

11/ See A/39/233, paras. 22 and 23.

12/ See A/39/326, paras. 22 and 23.

13/ A/C.2/39/7, pp. 13 and 14.

14/ See A/36/260/Add.1, para. 38, and Kahan, p.113.

15/ See A/44/637, annex, para. 20, and discussion below, and ICCP Newsletter No. 38, 25 November 1991, p. 7.

16/ See Baskin.

17/ See Hayton.

18/ Ibid.

19/ "Helsinki Rules".

20/ A/36/260/Add. 1, paras. 41 and 42.

21/ A/C.2/39/7, p. 9.

22/ Ibid., pp. 9-10.

23/ Baskin, p. 16.

24/ See the Jerusalem Post of 28 May 1990.

25/ See Starr, Foreign Policy of Spring 1991.

26/ See A/39/326, June 1984, para. 34; A/46/263; Benvenisti 1986, and The Future of the Arab Nation, p. 194.

27/ A/46/263, para. 23.

28/ Ibid., para. 24.

29/ See, for instance, Israel Information Centre, 1991, p. 8.

30/ Benvenisti, p. 20, Benvenisti and Khayat, p. 26.

31/ Benvenisti, 1986 Report, p. 20, Benvenisti and Khayat, p. 26, Security Council Commission report, United Nations document S/14268.

32/ Roy, 1987.

33/ A/46/263.

34/ See A/C.2/39/7, p. 14.

35/ See Schwarz, 1982, p. 95.

36/ See Musallam, p. 36.

37/ See the American Austin-Statesman of 26 March 1989.

38/ See Kally, p. 917.

39/ Mekorot, January 1985 (Hebrew) and Mekorot, September 1987, p. 7.

40/ Benvenisti, 1986 Report, p. 21.

41/ See Mekorot 1987 p. 22, and A/39/326 paras. 22, 23 and Musallam, 1990, p. 5.

42/ Kolars, 1990, p. 66.

43/ See Israel Office of the Water Commissioner, April 1991.

44/ See A/C.2/39/7, p. 16.

45/ See Mekorot, September 1987, p. 19.

46/ Ibid.

47/ Schiff, p. 24.

48/ See Anderson, Arab Affairs, p. 78.

49/ See Palestine Liberation Organization and Mekorot 1987.

50/ Gulf Centre, January 1991, pp. 16 and 17.

51/ Harmlani.

52/ Schmida, p. 27.

53/ See A/5409.

54/ Dillman, 1989, p. 50.

55/ According to Mr. Dillman, the Johnston/Main Plan envisaged the following allocation of water: Israel - 394 m.cu.m., Jordan - 774 m.cu.m., Syria - 45 m.cm.m., Lebanon - none (total - 1,213 m.cu.m.). (See Dillman, Jeffrey, "Water rights in the occupied territories", in Journal of Palestine Studies, Autumn 1989, pp. 50-51).

56/ See Anderson, Arab Affairs, pp. 78 and 79 and Mekorot, September 1987, p. 4 and Ataöv.

57/ United Nations, Department of Technical Cooperation for Development, Natural Resources/Water Series No. 9, Ground Water in the Eastern Mediterranean and Western Asia, 1982, p. 79 (ST/ESA/112) and Office of the Israel Water Commission, April 1991, and Mekorot, September 1987, p. 22.

58/ The Other Front, 6 June 1991.

59/ Security Council Commission report, S/14268, para. 210.

60/ See also Casa, p. 27.

61/ Musallam, 1991, p. 5; see also A/42/384.

62/ See A/46/263, annex, para. 59.

63/ See Israel statement in A/C.2/39/7, p. 9; Golan Academic Association radio interview broadcast by WBAI in New York on Thursday, 22 August 1991; Mekorot, September 1987, p. 19, and Inbar and Maos, 1983. A/46/282, para. 247, report of the Special Committee to Investigate Israeli Practices Affecting the Human Rights of the Palestinian People and Other Arabs of the Occupied Territories, dated 30 August 1991, reads as follows:

> "247. On 18 May 1991, Housing Minister Ariel Sharon declared before the Knesset that the Jewish population of the Golan Heights would be tripled by building 2,400 housing units there over the next two years. He said the building

programme was a concrete statement of the Government's intention to remain on the Golan. Sharon said 20,000 people would join the 11,000 currently living in the Golan. (Ha'aretz, Jerusalem Post, 19 March 1991)"

64/ See, for instance, General Assembly resolution 45/83 of 13 December 1990 on the situation in the Middle East, paragraph 9.

65/ Schmida, and Inbar and Maos, 1983.

66/ See A/46/263, para. 58.

67/ See Inbar and Maos, in Kidma, 1983, p. 25.

68/ See A/37/238, annex I, p. 9, 1982, para. 26.

69/ Jerusalem Post, 23 July 1990.

70/ Benvenisti, 1986.

71/ See A/39/326, 1984.

72/ See Efraim Inbar, p. 90.

73/ See Schiff, p. 24.

74/ See A/32/326, para. 14.

75/ See A/46/263-E/1991/88, p. 15, para. 38.

76/ The Jerusalem Post of 2 July 1987.

77/ See A/39/326, para. 27.

78/ See S/14268 and A/46/263, para. 58.

79/ S/14268, para. 205.

80/ Note by the Secretary-General, Report of the Special Committee to Investigate Israeli Practices Affecting the Human Rights of the Population of

the Occupied Territories, General Assembly, Forty-fourth Session, 12 October 1989, para. 198 (A/44/599).

81/ The Jerusalem Post, 5 September 1986, p. 9, and Schiff.

82/ See Schiff, p. 22.

83/ Jerusalem, No. 72, May 1991 (Palestine Committee for NGOs).

84/ See A/46/263, para. 31.

85/ Benvenisti 1986, Schwarz 1982 and ICCP, International Coordinating Committee for Non-Governmental Organizations on the Question of Palestine, "Land and Water", background paper No. 1, 14 March 1989, p. 4.

86/ Roy, 1986, p. 51.

87/ Cooley, 1984, p. 17.

88/ Harmlani, 1989, pp. 60-68.

89/ S/14268, para. 205.

90/ See Musallam, 1990.

91/ Rowley, p. 45.

92/ A/36/260/Add 1, p. 11, para. 28; and see A/37/347, annex, p. 9, and A/C.2/39/7, p. 17.

93/ A/39/326, 194, para. 41.

94/ United States Department of State, February 1991, p. 1492.

95/ Naff, Hearing 1990, p. 187 and Christian Science Monitor, 23-29 March 1990.

96/ Gruen, p. 311.

97/ A/39/326, para. 16.

98/ A/37/238, 1982, annex I, para. 25, Kahan, p. 23, and Benvenisti and Khayat, pp. 113-114.

99/ See A/46/263, paras. 54-58, and S/14268, para. 205, Kahan, p. 23, and Benvenisti and Khayat, pp. 113-114.

100/ See Jerusalem Post, 5 September 1986.

101/ See Benvenisti and Khayat, p. 32, table 2, and Palestine Yearbook, vol. V, 1989.

102/ See Benvenisti and Khayat, p. 32, table 2.

103/ See Mr. Musallam, p. 46; the author also states that during the same period, Israel received $24.3 billion in grants and low-interest loans from the United States, or for each $1 of aid received by the Palestinians, Israel received $476.

104/ See Israel, Central Bureau of Statistics, 1989, No. 40, table XXVII/44, p. 745. One new Israeli shekel (NIS) = 100 agurot or approximately US$.68 in 1986.

105/ A/C.2/39/7, p. 18.

106/ See the Jerusalem Post, 2 July 1987.

107/ Ibid.

108/ Palestine Liberation Organization, Economic Department, "Israeli plans to appropriate Arab water", paper presented to the Conference of Officials in Charge of Palestinians Affairs in the Arab Host Countries, Forty-fifth session, Damascus, 21-27 July 1990.

109/ See also The New York Times of 21 April 1991, p. 8.

110/ See the Jerusalem Post, 2 July 1987.

111/ Kahan, 1987, p. 113.

112/ See Benvenisti, 1986, pp. 21-22.

113/ Ibid.

114/ See Settlement Watch briefing paper entitled "Soviet Jews: Whose humanitarian concern?", January 1992.

115/ See The Jerusalem Post, 12 July 1990, pp. 2 and 27 July 1990, p. 8.

116/ See Naff, p. 153.

117/ Report on Israeli Settlements in the Occupied Territories (Foundation for Middle East Peace), vol. 1, No. 4, July 1991.

118/ Baskin, Challenge, J-M 1991.

119/ Report of the Secretary-General, entitled "Permanent sovereignty over national resources in the occupied Palestinian and other Arab territories" (A/39/326-E/1984/111), 29 June 1984, para. 18.

120/ Ibid., paras. 11 and 40.

121/ A/C.2/39/7, pp. 6-7.

122/ Ibid., p. 14.

123/ A/46/263, para. 57.

124/ S/14268, para. 203.

125/ A/36/260/Add.1, para. 29.

126/ United Nations 1984, para. 14.

127/ Dillman, p. 52.

128/ A/C.2/39/7, pp. 7-8.

129/ Ibid., p. 7.

130/ Ibid., p. 8.

131/ A/46/263, p. 21.

132/ See A/36/260/Add.1, para. 53.

133/ Jordan, Ministry of Foreign Affairs, "Memorandum".

134/ A/39/326, para. 24.

135/ Ibid., para. 17.

136/ Ibid., para. 32.

137/ Report of the Secretary-General entitled "Living conditions of the Palestinian people in the occupied Arab territories: Development and international economic cooperation" (A/35/533), 17 October 1980.

138/ A/39/326, para. 14.

139/ A/39/326.

140/ A/46/263, annex, para. 58.

141/ Mekorot, September 1987, p. 16.

142/ See Schmida, p. 23, and A/46/488.

143/ A/46/263, annex para. 58.

144/ See Kahan, p. 89, Benvenisti and Khayat, p. 26, The Jerusalem Post, 7 June 1990 and United Nations document A/36/260/Add.1, paras. 25 and 26.

145/ Arab Studies Society, communication of 20 February 1991.

146/ See A/37/238, para. 24, A/39/326, para. 27, and A/46/263, paras. 44-48, and Musallam, p. 27.

147/ See A/40/373, para. 11, Benvenisti 1986, p. 21, Benvenisti and Khayat, pp. 26-27, and Schwarz, p. 99.

148/ See A/46/263, annex, paras. 16 and 17.

149/ See A/39/326 para. 28, and Dillman 1989.

150/ Ibid, p. 7.

151/ See A/36/260/Add.1, para. 53.

152/ See A/46/263, annex, para. 58.

153/ See Harmlani 1989, pp. 60-68.

154/ See Musallam, p. 26.

155/ See Musallam, 1990, p. 27, and S/14268.

156/ See Benvenisti and Khayat, p. 27, and Benevenisti, p. 10.

157/ See Musallam, 1990, p. 24.

158/ See Musallam, 1990, p. 26.

159/ See A/37/347, annex, p. 10.

160/ See Roy, 1987, p. 69, Kahan, 1987, p. 26, and A/34/536, annex I, para 46.

161/ See Kahan, p. 110, Benvenisti and Khayat, p. 113.

162/ Rowley, p. 45.

163/ Ibid.

164/ See A/37/347, annex, p. 10.

165/ Ibid., p. 7.

166/ See Israel, Central Bureau of Statistics, 1989, No. 40, table XXVII/30, p. 731.

167/ See Roy, 1987, p. 69.

168/ See the Journal of Arab Affairs, vol. 8, No. 1, 1989, p. 41; the annex to the note by the Secretary-General (A/46/263), states that according to the population and housing census of 1961, 35 per cent of the labour force

in the West Bank worked in agriculture (A/46/263, para. 15). Ms. Rubenberg also states that with regard to industry, the share of industrial contribution to the GDP in the West Bank fell from 8.3 per cent in 1968 to 7.9 per cent in 1985. Approximately 16 per cent of the West Bank work force is employed in the industrial sector (about the same as in 1968). In the Gaza Strip, in 1985, industry's share of GDP was 8.7 per cent as compared to 4.5 per cent in 1966 - a notable increase but reflecting no structural improvement in the economy; the construction sector witnessed a major increase in its share of GDP from a 1968 level of 3.1 per cent to a 1985 level of 17.8 per cent. In the West Bank, as in Gaza, the construction sector grew significantly from 3.5 per cent of GDP in 1968 to 15.8 per cent in 1985 and investment in residential construction was approximately 86 per cent of the total. Also paralleling Gaza, the service sector in the West Bank constitutes a large portion of GDP, declining slightly from 51.6 per cent of GDP in 1968 to 46.1 per cent in 1985, states Ms. Rubenberg.

169/ See S/14268.

170/ ICCP Newsletter #35, pp. 6-8.

171/ See Schmida, p. 22.

172/ See Tanmiya, March 1991, pp. 3-4.

173/ See General Assembly resolution 39/223 entitled "Economic development in the occupied Palestinian territories" of 18 December 1984, and subsequent resolutions on assistance to the Palestinian people.

174/ See S/14268, para. 202.

175/ See Katanani, Ahmad, para. 22.

176/ See Ataõv, p. 7, note 5, p. 11.

177/ See Hadashot article of 19 January 1988, reproduced in: Report, The Israeli League for Human and Civil Rights, Human Rights violations during the Palestinian uprising, 1988-1989, p. 10.

178/ See Musallam, 1990, pp. 29-30; see also The Jerusalem Post, 23 July 1990 and 25 July 1990.

179/ Ibid.

180/ See From the Field, February 1991, pp. 3-4 and Palestine Solidarité No. 63, March 1991, p. 19.

181/ Austin-American Statesman, United Nations document A/45/13 (UNRWA), United Nations document A/44/367, para. 20 and The Jerusalem Post of 2 July 1987.

182/ See Schiff, p. 21 and Benvenisti and Khayat, Atlas, pp. 113-114, Dillman 1989, p. 56; and United Nations document S/14268, Security Council Commission report, para. 204.

183/ See Tanmiya, June 1991, p. 7.

184/ A/C.2/39/7, p. 17.

185/ A/36/260/Add. 1, paras. 25 and 26.

186/ See A/37/238, annex I, p. 8, para. 24.

187/ See ILO, Director-General's report, 1990, vol. 2, pp. 38-39.

188/ UNCTAD (TD/B/1221, para. 42) indicates approximately 500 million cu m are being used by Israel and its settlements.

189/ A/46/263, annex, table 1, Benvenisti and Khayat, p. 26, and Kahan p. 113.

190/ See TD/B/1221, para. 42.

191/ See Kahan p. 23, Benvenisti and Khayat, pp. 113-114 and Benvenisti, 1986, p. 21.

192/ Benevenisti and Khayat, p. 26, Kahan, pp. 20-22, and Cooley, p. 17.

193/ Benvenisti and Khayat, p. 113, and Benvenisti, 1986 Report, p. 21.

194/ See Israel Ministry of Defence, p. 71.

195/ Benvenisti, 1986 Report, p. 21.

196/ Palestine Liberation Organization, p. 3, Benvenisti, 1986, p. 22, and Benvenisti and Khayat, p. 26.

197/ See Harmlani 1989, pp. 60-68.

198/ Benvenisti and Khayat, pp. 113-114.

199/ Roy, 1987.

200/ See, for instance, Israel Ministry of Defence, p. 71.

201/ Benvenisti and Khayat, p. 113.

202/ Israel Ministry of Defence, p. 71, Jerusalem Post, 5 September 1986 and Schwarz, p. 99.

203/ United Nations document, UNCTAD, TD/B/1221, p. 15.

204/ See United Nations document A/36/260/Add.1, para. 44.

205/ See Schwarz, ibid., p. 99.

206/ See Roy, 1986, p. 51 and 1987, p. 69.

207/ See United Nations document A/C.39/7, p. 15.

208/ Israel, Ministry of Defence, p. 71.

209/ See United Nations document A/36/260/Add.1, para. 44.

210/ See Schwarz, p. 99.

211/ See Jerusalem Post, 2 July 1987, p. 15.

212/ See Schiff, p. 22.

213/ See A/46/263, annex, para. 59.

214/ See A/C.2/39/7, p. 14.

215/ See Roy, 1986, p. 51.

216/ See Schwarz, 1982, p. 98.

217/ See Palestine Liberation Organization, p. 3, Benvenisti, 1986, p. 22, and Benvenisti and Khayat, p. 26.

218/ See Benvenisti, 1986, and Baskin, 1991.

219/ See Naff, p. 153, and S/14268, para. 205.

220/ Ibid. and United Nations document S/14268.

221/ See Musallam 1990, p. 5.

222/ See, for instance, Ataöv, p. 6 and Schmida, p. 22.

223/ See S/14268, para. 203.

224/ See Musallam, 1990, p. 6.

225/ See Benvenisti and Khayat, p. 114 and Kahan, p. 26.

226/ See Austin American-Statesman, p. H6.

227/ See A/38/265-E/1983/85, p. 21, para. 51.

228/ See Musallam, 1990, pp. 19-20.

229/ See Dillman, 1989.

230/ Ataöv, p. 5.

231/ See, for instance, resolutions 41/63 D of 1986 and 45/74 A of 1990.

232/ See Anderson, Arab Affairs, 1988, Cooley, Schiff, Gulf Centre, The New York Times of 17 July 1991, p. A20.

233/ See the Financial Times, World Press Review, May 1989.

234/ See Ataöv, p. 4.

235/ Translated in FBIS-NES-90-181, 18 September 1990, p. 41.

236/ Ibid.

237/ As quoted in Dillman, p. 48.

238/ See Anderson, Arab Affairs, summer/autumn, 1988, p. 79.

239/ Mr. George E. Gruen, Adjunct Professor of International Relations, Columbia University, in his written statement on Middle East water submitted to the Subcommittee on Europe and the Middle East of the Committee on Foreign Affairs, House of Representatives, one hundred and first Congress in 1990, published as appendix 5 of the proceedings of the hearing, suggests the following source for a more in-depth and detailed analysis of such projects: Elisha Kally's "A Middle East Water Plan under Peace", The Armand Hammer Fund for Economic Cooperation in the Middle East, Tel Aviv University, March 1986. Dr. Kally was director of long range water planning for Israel until his retirement (p. 324).

240/ The Christian Science Monitor, 16 March 1990, "Pouring Oil on Troubled Middle East Water", p. 5.

241/ See A/C.2/39/7, p. 12.

242/ See Musallam, 1990, p. 38.

243/ Schiff, pp. 21-23.

244/ See Starr, p. 23.

245/ Jerusalem Post, 24 March 1991, p. 5.

246/ See Gruen, p. 324.

247/ See Gruen, pp. 326-327.

248/ See Starr, p. 26.

249/ See Schiff and Harmlani, 1989, pp. 60-68.

250/ See Schiff, p. 22.

251/ See Schiff, p. 23.

252/ See Baskin, Challenge, vol. 2, No. 1, p. 17.

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